



279383

**FIVE – YEAR REVIEW REPORT**

**THIRD FIVE-YEAR REVIEW REPORT**

**For**

**FOREST WASTE DISPOSAL SITE**

**Forest Township**

**Genesee County, Michigan**

**SEPTEMBER, 2007**

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A handwritten signature in dark ink that reads "Richard Karl". The signature is written over a horizontal line.

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Date:

9-21-07

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## LIST OF ACRONYMS AND ABBREVIATIONS

CAA:	Contamination Attenuation Area (area potentially needed for contaminated groundwater to attenuate)
CRA:	Conestoga-Rovers & Associates, a technical consultant for the FWCC
CCCs:	Criteria for continuous concentrations from the <i>National Recommended Water Quality Criteria:2002</i> , EPA-8220-R-02-04, November 2002.
FWCC:	Forest Waste Coordinating Committee (group of settling parties who are implementing the remedial actions pursuant to a Consent Decree with U.S. EPA)
GCHD:	Genesee County Health Department
GWALs:	Groundwater action levels selected in the ROD / ROD Amendment
ICs:	Institutional Controls (non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy).
IRIS:	U.S. EPA's Integrated Risk Information System, which identifies and explains toxicity factors endorsed by U.S. EPA
iSOC®	A proprietary technology named in-situ submerged oxygen curtain
LEL:	Lower Explosive Limit, the lowest concentration of a combustible gas that could support an explosion
MCL:	Safe Drinking Water Act Maximum Contaminant Level
MDEQ:	The Michigan Department of Environmental Quality
MDNR:	The Michigan Department of Natural Resources (the predecessor of MDEQ)
MDWC:	Michigan Generic Residential Drinking Water Criteria
mg/kg:	Concentration of a contaminant in soil in milligrams of contaminant per kilogram of soil, which is also equal to parts per million by weight
mg/kgd:	Rate of exposure to a contaminant in milligrams per kilogram body weight per day

MGSI:	Michigan Groundwater / Surface Water Interface Criteria
OMMP:	<i>Operation, Maintenance, and Monitoring Plan</i> , CRA, February 2007.
PBBs:	Polybrominated biphenyls
PCBs:	Polychlorinated biphenyls
PRA:	Pumping Restriction Area (area where pumping could interfere with U.S. EPA's cleanup)
PRGs:	Region 9 Preliminary Remediation Goals. These are risk-based screening levels.
RCRA:	Resource Conservation and Recovery Act
RI/FS:	Remedial Investigation/Feasibility Study
ROD:	Record of Decision
RPM:	U.S. EPA's Remedial Project Manager
Selected Remedy:	The remedial actions selected by U.S. EPA in decision documents, including RODs, ROD Amendments, and Explanation of Significant Differences
SVOCs:	Semivolatile organic compounds
μg/l:	Concentration of a contaminant in water in micrograms of contaminant per liter of water, which is approximately equal to parts per billion by weight
U.S. EPA:	The United States Environmental Protection Agency
VOCs:	Volatile Organic Compounds

## **Executive Summary**

Hot spot removal of waste from the landfill was completed in 1993. U.S. EPA categorized the Site as construction complete on July 30, 1997, when construction of the landfill cap was completed. This five-year review reconfirms that the removal of the lagoons, hot-spot removal, and construction of landfill cap and fencing were completed in accordance with the selected remedy.

From 1996 – 2007, the groundwater contamination north of the landfill has been delineated, and remedial actions evaluated and designed. In 2005, U.S. EPA approved a Record of Decision (ROD) Amendment, which added the following components to Operable Unit (OU) #2 of the selected remedy: in-situ treatment of groundwater contamination north of the landfill; restrictions on installation of new pumping wells off-Site; a contingency for replacement of residential wells; and updates to cleanup standards. The design for in-situ chemical oxidation treatment has been completed, and treatment will be initiated in October 2007. Groundwater treatment near the landfill was investigated but may not be necessary because current data indicates that the contaminants now migrating from the landfill are naturally attenuating before reaching the Site boundaries. A restrictive covenant is in place on the Site property. Site access outside of the landfill area is restricted to recreational activities through a Forest Township permit system. Installation of new pumping wells off-site is being restricted through Genesee County Environmental Health regulations. There have been no reports of improper usage of the Site property, nor of installation of new pumping wells near the Site.

The remedy for OU#1 (lagoon removal action) was completed in 1989 and is protective of human health and the environment from the former contents of the lagoons.

The remedy for OU#2 (landfill and groundwater) is expected to be protective of human health and the environment upon attainment of the GWALs through groundwater treatment, and natural attenuation (OU#2). In the interim, exposure pathways that could result in unacceptable risks are being controlled through maintenance of the fencing and landfill cap, monitoring, institutional controls, and a contingency to replace residential wells. To assure protection to human health and the environment, monitoring for dissolved methane will be added to the long-term monitoring plan, and the monitoring requirements for oxidant entering the lake will be defined before in-situ chemical oxidation is conducted near the lake.

The overall selected remedy is protective of human health and the environment in the short term and will be protective in the long-term upon attainment of the GWALs for OU#2.

## Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name (from WasteLAN): Forest Waste Disposal		
EPA ID (from WasteLAN):		
Region: 5	State: MI	City/County: Genessee County
SITE STATUS		
NPL status: <input checked="" type="checkbox"/> Final <input type="checkbox"/> Deleted <input type="checkbox"/> Other (specify)		
Remediation status (choose all that apply): <input type="checkbox"/> Under Construction <input type="checkbox"/> Operating <input checked="" type="checkbox"/> Complete		
Multiple OUs? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO	Construction completion date: 6 / 30 / 1997	
Has site been put into reuse? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO		
REVIEW STATUS		
Lead agency: <input checked="" type="checkbox"/> EPA <input type="checkbox"/> State <input type="checkbox"/> Tribe <input type="checkbox"/> Other Federal Agency _____		
Author name: Richard Boice		
Author title: Remedial Project Manager	Author affiliation: U.S. EPA	
Review period:** 02 / 07 / 2007 to 9 / ____ / 2007 ( date of signature)		
Date(s) of site inspection: 8 / 22 / 2007		
Type of review: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input checked="" type="checkbox"/> Post-SARA</span> <span><input type="checkbox"/> Pre-SARA</span> <span><input type="checkbox"/> NPL-Removal only</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Non-NPL Remedial Action Site</span> <span><input type="checkbox"/> NPL State/Tribe-lead</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Regional Discretion</span> </div>		
Review number: <input type="checkbox"/> 1 (first) <input type="checkbox"/> 2 (second) <input checked="" type="checkbox"/> 3 (third) <input type="checkbox"/> Other (specify) _____		
Triggering action: <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Actual RA Onsite Construction at OU # _____</span> <span><input type="checkbox"/> Actual RA Start at OU# _____</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Construction Completion</span> <span><input checked="" type="checkbox"/> Previous Five-Year Review Report</span> </div> <div style="display: flex; justify-content: space-between; margin-top: 5px;"> <span><input type="checkbox"/> Other (specify)</span> </div>		
Triggering action date (from WasteLAN): 9 / 30 / 2002		
Due date (five years after triggering action date): 9 / 30 / 2007		

\* ["OU" refers to operable unit.]

\*\* [Review period should correspond to the actual start and end dates of the Five-Year Review in WasteLAN.]

## **Five-Year Review Summary Form, cont'd.**

### **Issues:**

1. On-site groundwater exceeds screening criteria to prevent fire and explosion risks from dissolved methane if pumping wells are installed in the future, and the long-term monitoring plan does not include monitoring for dissolved methane
2. There may be a need to monitor for oxidant entry into the lake during in-situ chemical oxidation treatment near the lake.

### **Recommendations and Follow-up Actions:**

1. Add dissolved methane to the long-term monitoring.
2. Proceed with treatment in locations where entry into the lake is not a concern, and delay treatment in other locations until monitoring requirements are defined.

**Protectiveness Statement(s):** The remedy for OU#1 (lagoon removal action) was completed in 1989 and is protective of human health and the environment from the former contents of the lagoons.

The remedy for OU#2 (landfill and groundwater) is expected to be protective of human health and the environment upon attainment of the GWALs through groundwater treatment, and natural attenuation (OU#2). In the interim, exposure pathways that could result in unacceptable risks are being controlled through maintenance of the fencing and landfill cap, monitoring, institutional controls, and a contingency to replace residential wells. To assure protection to human health and the environment, monitoring for dissolved methane will be added to the long-term monitoring plan, and the monitoring requirements for oxidant entering the lake will be defined before in-situ chemical oxidation is conducted near the lake.

The overall selected remedy is protective of human health and the environment in the short term and will be protective in the long-term upon attainment of the GWALs for OU#2.

Date of last Regional review of Human Exposure Indicator (from WasteLAN): 11 / 21 / 2005

Human Exposure Survey Status (from WasteLAN): Current Human Exposure Under Control and Protective Remedy in Plan

Date of last Regional review of Groundwater Migration Indicator (from WasteLAN): 3 / 14 /

2007 Groundwater Migration Survey Status (from WasteLAN): Contaminated Ground Water Under Control

## I. Introduction

This report presents the results of the third five-year review for the Forest Waste site (Site) located in Genesee County, Michigan. This review was performed by the United States Environmental Protection Agency (U.S. EPA). The following parties also provided input into the review; the Michigan Department of Environmental Quality (MDEQ), the Forest Waste Coordinating Committee (FWCC), and Conestoga-Rovers & Assoc. (CRA), a contractor for the FWCC.

The purpose of this review is to evaluate implementation and performance of the remedial actions in order to determine whether or not the remedy is or will be protective of human health and the environment. This report documents the methods, findings, and conclusions of this review, including identifying issues and recommendations.

The remedial action that U.S. EPA selected for the Site will result in hazardous substances remaining above concentrations that would allow unlimited use and unrestricted exposure at the end of the remedial action. Therefore, a five-year review is required by statute. §121(c) of the Comprehensive Environmental Response Compensation and Liability Act, 42 U.S.C. § 9621 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA) states:

*If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than every five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such review.*

U.S. EPA interprets this requirement further in 40 CFR §300.430(f)(4)(ii) of the National Contingency Plan:

*If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

The first *Five-Year Review Report* was completed on March 28, 1997, and the second on September 30, 2002. The Site remedy was also thoroughly evaluated for the ROD Amendment, which was approved on September 29, 2005.

This report will be placed in the Forest Waste Disposal Site Administrative Record file located at U.S. EPA's office at 77 W. Jackson Boulevard, Chicago, Illinois, and in the local document repository, which is located at Forest Township Library, 130 East Main Street, Otisville, Michigan 48463.

## **II. Site Chronology**

For a more detailed chronology for the period prior to 2002, see the Second Five-Year Review Report.

1973-1978: Wastes were disposed at the Site in a landfill and nine waste lagoons.

1978-1982: MDNR installed and sampled monitoring wells and sampled lagoons. The GCHD collected residential well samples.

1983-1988: U.S. EPA added the Site to the National Priorities List in 1983. U.S. EPA conducted the Remedial Investigation / Feasibility Study (RI/FS).

1984: U.S. EPA constructed a fence around the Site, in accordance with an Initial Remedial Measures Record of Decision (ROD) issued that same year.

1986: U.S. EPA issued a ROD for operable unit (OU#1) providing for removal and off-Site treatment and disposal of contaminated liquids, sediment, sludge and soil from the lagoons.

1987: MDNR assumed ownership of the Site property.

1988: U.S. EPA issued a ROD for final remedial actions to address the landfill and groundwater (OU#2).

1988-1989: A group of private parties, who had formed the FWCC, completed the lagoon removal. This concluded work on OU#1.

1989 - 1990: U.S. EPA excavated test pits into the landfill, and removed and staged 500 drums containing wastes.

1990: U.S. EPA approved the FWCC's Construction Completion Report for the lagoon removal. U.S. EPA initiated the routine groundwater monitoring program for the east plume (contaminated groundwater located east of the landfill).

1992: The FWCC removed and disposed of drums staged on Site by U.S. EPA.

1993: The FWCC completed hot-spot drum and contaminated soil removal from the landfill. The FWCC took over the groundwater monitoring effort. U.S. EPA modified the 1988 ROD with an *Explanation of Significant Differences*.

1995: The FWCC entered a Consent Decree with U.S. EPA, in which they agreed to implement the final selected remedial actions in accordance with U.S. EPA's ROD. The FWCC sampled additional monitoring wells installed at the request of U.S. EPA and MDEQ, and detected highly contaminated groundwater north of the landfill.

1995-1997: The FWCC completed construction of the landfill cap and gas venting system, initiated investigation of the north plume (contaminated groundwater migrating north from the landfill), and purchased an additional 80 acres of property north of the landfill, which was used as a source of soil for the landfill cap, and which is largely underlain by the north plume.

1997: U.S. EPA issued a Preliminary Closeout Report, and a *Five-Year Review Report*.

1997- present: The FWCC has conducted; long-term groundwater monitoring for the east plume, maintenance of the Site fence and landfill cap, and a phased investigation of the north plume.

1999: Forest Township received ownership of the Site property, and 80 acres of property north of the Site.

2001: Volatile organic compounds (VOCs) were detected near Site boundaries, and annual sampling of nearby residential wells was initiated.

December 2001: The FWCC started evaluation of remedial technologies to treat the north plume.

September 2002: U.S. EPA issued the *Second Five-Year Review Report*.

July 2003 - May 2005: The FWCC conducted planning, performance and reporting on bench-scale testing of in-situ chemical oxidation technology.

August 2003 - May 2007: FWCC planned and conducted landfill gas monitoring.

September 2004: The FWCC completed the Remedial Alternatives Evaluation Report.

May 2005 - June 2006: The FWCC planned and conducted pilot-scale testing of the proprietary in-situ submerged oxygen curtain<sup>®</sup> (iSOC<sup>®</sup>) technology.



May 2005 - June 2007: The FWCC conducted planning, performance, and reporting for pilot testing, delineation sampling, and design for in-situ chemical oxidation in the shallow aquifer.

July 2005 - May 2006: The FWCC conducted planning, performance, and reporting for modeling to improve the definition of the groundwater restriction areas (the contamination attenuation area (CAA), and the pumping restriction area (PRA))

September 2005 - June 2007: The FWCC conducted planning, performance, and reporting for pilot testing, delineation, and design for in-situ chemical oxidation near the western Site boundary in the deep aquifer.

September 29, 2005: U.S. EPA issued a ROD Amendment requiring additional groundwater remedial actions (OU#2) to address the north plume, and updating the groundwater action levels (GWALs).

July 2006 - ongoing: FWCC conducted planning and performance for modeling for shut-down of the groundwater treatment system near the landfill.

### **III. Background**

#### **Physical Characteristics**

The Site is located in a rural area off of East Farrand Road near Otisville, in Forest Township, Genesee County, Michigan (see Attachment 1). The Site covers approximately 190 acres. The Site topography is generally flat (see Attachment 2). The northern boundary of the Site crosses an unnamed small manmade lake. To the northeast and east of the Site, are interconnected wetlands, which drain to Butternut Creek, which flows within 700 feet of the southeast corner of the Site property.

The hydrogeology is irregular in the vicinity of the Site, but generally the following hydrogeologic units are present (from top to bottom):

- a surficial unsaturated unit of clay and silty clay, which is from 0 - 20 feet thick;
- a shallow sand aquifer, which is 10 - 50 feet thick;
- an intermediate confining unit of stiff relatively impermeable gray till, which is 0 - 25 feet thick;
- a deep sand and gravel aquifer which is 32 - 67 feet thick;
- a lower till unit of gray silt and clay, which appears to be present throughout the area and protects the bedrock aquifers from contamination; and
- bedrock, including sandstone aquifers, which is the source of most water from residential wells in the area.

## **Land and Resource Use**

When added to the National Priorities List, the Site covered about 112 acres, and included an 11 acre landfill, and nine lagoons covering a total area of about one acre (see Attachment 3). Part of the 112 acres was formerly used as an airport. Approximately 80 acres north of the landfill were added to the Site definition in the 2005 ROD Amendment (see Attachment 1). The additional 80 acres includes the southern part of an unnamed lake. Although much of the 80 acres was formerly used for farming, many soil borings have been collected and groundwater monitoring wells have been installed on the property.

Much of the property west of the Site is used for farming. There are widely spaced residences along the nearby roads, including Harris, Lake, and Farrand Roads. The northern half of the lake is on adjacent parcels north of the Site. A gravel quarry and undeveloped wetlands are adjacent to the east boundary. The area of the Site east and north of the landfill drains into these wetlands or to the lake. All of the residences use groundwater for drinking. Twenty-nine residential wells have been identified located within about one-half mile of the northern portion of the Site where contaminated groundwater is present.

## **History of Contamination**

Waste disposal occurred on Site in a landfill and in nine lagoons between 1973 and 1978. Wastes disposed included waste oils, plating waste, metal sludge, brewery waste, sewage sludge, resin and paint waste, septic tank waste, phosphate-zinc waste, spent sulfuric acid, caustic pipe cleaning water, sauerkraut brine, fly ash, and wastes contaminated with polychlorinated biphenyls (PCBs) and polybrominated biphenyls (PBBs). Apparently most liquids were disposed in the lagoons, although disposal of liquids into the landfill and onto the surrounding ground may have occurred. Drummed wastes were buried in the landfill. Incoming wastes were apparently not closely screened, and the landfill area was managed in a haphazard manner with trenches dug randomly and filled with a mixture of wastes.

Geological cross sections of the lagoons indicate that the bottom of the lagoons may not have penetrated the surficial silty clay layer. The landfill was not significantly elevated above adjacent properties before construction of the cap. The landfill is estimated to contain 260,000 cubic yards of waste and soil. Because there was no dewatering, it is believed that only a small percentage of the wastes were deposited below the water table. However, a bulldozer operator stated that barrels had been buried in the landfill to depths of 20-30 feet, sometimes below the water table, which suggests that some of the burial extended to below the surficial silty clay layer and into the shallow sand aquifer.

The following three landfill disposal events are of special concern. In June 1974, sludge, residual products and structural wastes from the Agrico Chemical Warehouse was disposed at the landfill. Methyl parathion, malathion, aldrin chlordane and other herbicides are known to have been used or produced at Agrico Chemical, but it is not known whether the wastes contained these chemicals. In July 1975, PCB-contaminated roofing material was disposed at the landfill. In December 1975, an estimated 8 cubic yards of PBB-contaminated cattle feed was disposed at the landfill. These three disposal events were under the direction of the MDNR and the GCHD, and the required disposal methods included burial of the wastes to 8 feet deep and covering with clay or concrete. However, there are no records showing that the required disposal methods were implemented. The State of Michigan did not renew the permit in 1978 due to various violations at the landfill.

### **Initial Response**

In 1978, MDNR did not renew the permit and initiated sampling. U.S. EPA fenced the waste areas of the Site in 1984. U.S. EPA conducted an RI in three phases from June 1984 through April 1987.

### **Basis for Taking Action**

The RI focused on characterizing the lagoon contents, the landfill contents, the hydrogeology, surface soil, surface water, sediment and groundwater quality. In general samples were analyzed for the organic and inorganic contaminants on U.S. EPA's Contract Laboratory analysis lists. A smaller number of targeted samples were also analyzed for PBBs, and some samples of landfill content were analyzed for dioxin/furans.

The lagoon (OU#1) content sampling included liquid samples from 3 of the 9 lagoons, surface sludge/sediment samples from 4 of the lagoons, composite soil samples from each of the 5 dry lagoons, and 30 subsurface soil samples from 6 of the lagoons. Surface sludge/sediment and liquid samples included analysis of PBBs. U.S. EPA concluded that the lagoon sludge and soil presented a human health threat based on detections of up to 5,170 mg/kg of lead, up to 66,500 mg/kg of chromium, and up to 8,210 mg/kg of barium. A number of VOCs detected at high concentrations in subsurface soils below the lagoons were also detected in groundwater, including: 1,1,1-trichloroethane (up to 15,000 mg/kg); tetrachloroethylene (up to 12,000 mg/kg); ethyl benzene (up to 420 mg/kg); and toluene (up to 320 mg/kg).

Before installation of the cap, the landfill (OU#2) was covered with vegetation and native soil, but refuse was exposed in several places. An estimated 100-200 deteriorating drums were exposed on the surface of the landfill, and presented an acute risk to trespassers. During the RI fifteen test pits were excavated into the landfill. The test pits locations were based on file information, results from a magnetometer and

resistivity surveys, and surface soil data. The test pit investigation identified areas of general refuse, drummed solid wastes, drummed liquid hazardous waste, PBB-contaminated cattle feed, fire debris, and contaminated soil. Many of the drums were sitting in groundwater, apparently from perched groundwater. U.S. EPA collected samples of the landfill contents and detected high concentrations of a number of VOCs that were also detected in groundwater, including: benzene; chlorobenzene; ethylbenzene; methylene chloride; tetrachloroethylene; trichloroethylene; vinyl chloride; toluene; acetone; 2-butanone; 4-methyl-2-pentanone; and xylenes. There were also very high concentrations of lead (up to 9,560 mg/kg) chromium (up to 2,640 mg/kg), zinc (up to 26,200 mg/kg), phenol, and PBBs (up to 4,900 mg/kg), as well as some polyaromatic hydrocarbon and phthalate compounds (see Appendix A of FS). However, the landfill contents were not completely characterized during the RI. Dioxins and furans were also analyzed and were detected at a maximum equivalent tetrachlorodibenzodioxin concentration of 0.2 ppb, which was below the cleanup action level (1.0 ppb).

The RI included installation of 23 groundwater monitoring wells, with geological characterization of the borings. Groundwater (OU#2) sampling was conducted in three phases, with 14 samples collected during phase I, 22 during phase II, and 29 during phase III. Relative to the metals analyses, phase I included only analyses of unfiltered metals, phase II included analyses of filtered and unfiltered metals, and phase III included only filtered metals analyses. The RI water level survey indicated that groundwater in the shallow aquifer migrates from west to east and southeast from the Site. The RI data demonstrated that the shallow aquifer east and southeast of the lagoons, and landfill was contaminated by cyanide, dissolved solids, high pH, metals, several VOCs, 4-methylphenol, and 2-methylphenol; but the contamination did not appear to extend far off-Site. The only detections exceeding the present Safe Drinking Water Act Maximum Contaminant Levels (MCLs) were 38  $\mu\text{g/l}$  of methylene chloride in MW84-2S, and 11  $\mu\text{g/l}$  of trichloroethylene in MW85-1S, but even these detections were not repeated in more than one phase of sampling in the same monitoring wells. No VOCs were detected in the deep sand and gravel aquifer.

In 1995, high VOC concentrations were unexpectedly detected in a new monitoring well north of the Site. It was previously believed that all the contaminated groundwater migrated to the east from the landfill. The contamination north of the landfill has been characterized and delineated in phased investigations from 1996 through the present. It has been determined that the northward component of groundwater contamination from the landfill has migrated along three pathways (see Attachment 4): in the shallow aquifer to the north toward and to the west of the lake; in the shallow aquifer to the northwest and then into the deep aquifer as it approaches the western Site boundary; and into the deep sand and gravel aquifer north of the landfill. The 2005 ROD Amendment identified the following VOCs of primary concern because of detections exceeding the GWALs within 400 feet of the Site boundaries: benzene; 1,1-dichloroethane; 1,2-dichloroethane; 1,1-dichloroethylene; cis-1,2-dichloroethylene;

and vinyl chloride. Vinyl chloride is the only VOC that had been detected exceeding its GWAL in off-Site groundwater. The same VOCs plus carbon tetrachloride, chloroethane, and methylene chloride have exceeded their GWAL by more than a factor of two in groundwater near the landfill. From 2000 - 2001, there was a large jump in concentrations of cis-1,2-dichloroethylene, chloroethane, 1,1-dichloroethane, and vinyl chloride in groundwater near the landfill, but except for chloroethane, the concentrations of these VOC subsequently dropped off (see MW95-1S data in Attachment 5).

#### **IV. Remedial Actions**

##### **Remedy Selection**

1984 Interim Remedial Measure ROD: This ROD required construction of a fence around the Site.

1986 OU#1 ROD: The 1986 ROD required the following:

- removal, treatment and off-Site disposal of approximately 110,000 gallons of aqueous lagoon waste;
- excavation and off-Site disposal of all (approximately 4,000 cubic yards) contaminated sludge, sediment, and soil from lagoons 2, 3, 4, 6, 7, and 8 (no action was required for lagoons 1, 5, and 9);
- disposal of excavated sludge, sediments and soil at a RCRA permitted landfill; soil cleanup to  $10^{-6}$  for carcinogens, and to a hazard index of 1.0 for non-carcinogens assuming an soil ingestion rate of 0.1 gram/day.

1988 Design Analysis Report (OU#1): Among other requirements, the Design Analysis Report identified contaminant specific action levels for the lagoon excavation.

1988 ROD as Revised by 1993 Explanation of Significant Differences (OU#2): The 1988 ROD as revised by the 1993 Explanation of Significant Differences requires the following:

- removal and off-Site treatment of areas of concentrated drums and associated saturated contaminated soil in the landfill (conservatively estimated to include 4,000 drums of waste and 1,000 cubic yards of soil);
- construction of a RCRA cap over the landfill;
- maintenance of the fence around the Site, and construction of a separate fence around the landfill;
- deed restrictions to prevent excavation of soil and/or landfill contents, and use of groundwater for drinking on the Forest Waste property and areas immediately surrounding the Site;

- groundwater monitoring;
- a contingency to implement a groundwater treatment system if a GWAL is exceeded on an annual average basis in monitoring wells at the Site boundary (MW85-1S and MW85-2S) for residential water usage, or at locations up gradient from wetlands (MW86-2S, MW86-3S, MW86-4S) for aquatic life protection;
- GWALs for protection of public health for residential water usage were defined as: MCLs; lifetime health advisories in groundwater at the Site boundary;  $10^{-4}$  carcinogenic risk level; and non-carcinogenic risk index exceeding 1.0; and
- GWALs for aquatic protection were defined as Federal Ambient Water Quality Criteria; and the Michigan Surface Water Quality Guidelines for Protection of Aquatic Life.

1995 Consent Decree (OU#2): The 1995 Consent Decree Scope of Work contains the following more detailed requirements:

- the fence around the landfill shall be a six foot high chain link fence topped with three strands of barbed wire, and shall have a double 12-foot wide swing gate;
- warning signs (containing a local contact's telephone number) shall be posted at the gates and at 200 foot intervals along the fence;
- deed restrictions shall prohibit development of the whole Site, including excavations, construction and drilling, and the restrictions should be permanent (except that the restrictions on drinking water wells could be lifted if contaminant levels fall below the cleanup standards);
- groundwater monitoring requirements were specified;
- specific GWALs were specified;
- the contingent groundwater remedy shall be a groundwater pump-and-treat system, which must contain the contaminated groundwater on-Site;
- the landfill cover construction requirements were specified;
- characterization of landfill gas emissions was required, and a contingency was required to reduce or eliminate landfill gas emissions if emissions are found to cause an explosion hazard, or a risk to human health outside of the landfill boundaries exceeding a lifetime incremental cancer risk of  $10^{-6}$  or a hazard index of 1.0 for non-carcinogens.

2005 ROD Amendment (OU#2): The 2005 ROD Amendment included:

- updates to the GWALs and specification that the GWALs must be achieved at all property boundaries and up gradient from wetlands and the lake;
- addition of an 80 acre area north of the landfill to the Site definition;
- addition of restrictions on installation of new water supply wells on properties near the Site through enforcement of Genesee County Health Regulations;

- treatment of groundwater near the landfill using either iSOC<sup>®</sup>, or air sparging trench technology (must reduce VOCs exceeding the GWALs by at least 50% and result in achievement of GWALs at the property boundary taking into account natural attenuation);
- treatment of groundwater at down gradient locations by in-situ chemical oxidation;
- criteria for shut-down of the groundwater treatment systems;
- monitored natural attenuation down gradient from the chemical oxidation treatment, and between the landfill treatment and the Site boundaries;
- more definition of groundwater monitoring requirements and corrective actions;
- a contingency for replacement of residential wells if a contaminant from the Site or a contaminant introduced by the in-situ chemical oxidation is detected exceeding a GWAL in the residential well.

## **Remedy Implementation**

1. Remedial Actions Completed Before 2002: More information on the evaluation of remedial actions completed before 2002 is available in U.S. EPA's 2002 *Second Five-Year Review Report*, in the 1997 *Preliminary Closeout Report*, and in construction completion reports. In 1989, a group of private parties (a subset of the current FWCC) completed the removal of liquids, sludge and contaminated soil from the lagoons and achieved the cleanup requirements. This completed the remedial actions for OU#1, and all of the rest of the remedial actions were categorized in OU#2.

In 1993, the FWCC completed the drum and hotspot removal from the landfill. This remedial action was successful in removing some of the highly concentrated wastes. In 1997, the FWCC completed construction of the landfill cap and fencing around the landfill. The landfill cap and fence were constructed in accordance with U.S. EPA requirements. The cap consisted of the following layers listed from bottom to top: a grading layer; a gas vent layer; a CLAYMAX Geosynthetic Clay liner consisting of high density polyethylene with a nominal thickness of 60 mil. and adhering bentonite clay; geotextile along the perimeter of the Site; three feet of compacted clay; one foot of top soil; and vegetation. The landfill cap continues to eliminate the potential for trespassers to come into contact with landfill wastes. It was believed that the hot spot removal and landfill cap would result in a significant reduction in the amount of contaminants leaching to the groundwater from the landfill.

2. Groundwater Sampling Plans : All analytical data generated since the second five-year review has been collected in accordance with procedures defined in U.S. EPA-approved sampling plans and a Quality Assurance Project Plan (QAPP). A QAPP attached to the *Additional Investigation Work Plan* (CRA, October 1998) was in force until U.S. EPA approved a QAPP for the long term monitoring in May 2006.

The FWCC with input and oversight by U.S. EPA and MDEQ have conducted two groundwater sampling efforts: one for monitoring for compliance with groundwater action levels at the east property boundary and wetlands (east plume); and another for characterization and delineation of the groundwater contamination that has been migrating to the north from the landfill (north plume).

The purpose of the east plume monitoring has been to detect migration of contaminants eastward from the former landfill and lagoon area through the shallow aquifer to the Site boundary, to wetlands east of the Site, or downward into the deep sand and gravel aquifer. Monitoring requirements were included in the 1988 ROD and the 1995 Consent Decree. Since 1999, monitoring of the east plume has been reduced to annual sampling for VOCs in shallow groundwater at selected monitoring wells.

The north plume investigation has been conducted in phases, which generally has included one or two hydraulic and contaminant sampling events each year starting in 1997. Following review of the results for each phase, the sampling plan for the next phase was prepared. Vertical aquifer sampling was conducted at all new groundwater sampling locations. The investigations focused primarily on delineating the extent of VOC contamination.

In 2007, U.S. EPA approved the *Operation, Maintenance, and Monitoring Plan* (OMMP), which defined sampling requirements for the long-term monitoring. This plan provides for the following annual (except as noted) sampling to meet the objectives in the 2005 ROD Amendment:

- water level measurements at 79 well locations;
- sampling of 12 landfill monitoring wells to detect VOCs, SVOCs, pesticides, PAHs, PCBs, PBBs, metals, cyanide, and sulfide contamination migrating from the landfill (PCB and PBB analyses are required every 5 years north of the landfill and every 10 years east, west and south of the landfill; cyanide, PAHs, and pesticides analyses are required every five years in wells west, east and south of the landfill);
- sampling of 19 sentinel wells for only VOCs (except one monitoring well near the lake is also analyzed for SVOCs, metals, cyanide, sulfide, pesticides, PAHs, PBBs, and PCBs) to detect expansion of the plume, to monitor groundwater at Site boundaries and near the lake, and to assure protection to nearby residential well users by providing an early warning;
- sampling of 19 landfill to site boundary monitoring wells for VOCs, SVOCs, pesticides, PAHs, PCBs, PBBs, metals, cyanide, and sulfide to delineate the extent of non-VOC contamination, help evaluate natural attenuation, monitor the pace of cleanup, schedule chemical oxidation dosing, and help to determine when site boundary treatment can be discontinued (PCB and PBB analyses are only required every 10 years);
- sampling of six residential wells to assure that they are not affected by the contamination;



- sampling of five background wells to define background metals concentrations.

The plan notes that additional performance monitoring will be needed for the groundwater treatment, and will be defined in the final designs. The plan includes provisions for additional monitoring wells as needed to define the extent of contamination. The plan also includes criteria for adjusting the analytical requirements in response to future data. The OMMP does not include monitoring for dissolved methane.

In the OMMP, the FWCC also committed to replacing any existing residential wells if it is determined to be in an aquifer affected by the contamination, and that VOC contamination could reach the well within five-years.

3. Groundwater Monitoring of the East Plume: Monitoring for the east plume has included collection of two groundwater samples in 2002 and 2003, four in 2004, and seven in 2006. The 2006 monitoring was in accordance with the OMMP. The VOC data has verified that significant VOC contamination is not migrating off-Site to the east of the landfill in the shallow aquifer. The only detections exceeding the GWALs has been for 1,2-dichloroethane in groundwater samples from MW84-1S (detections have ranged from 7.2 - 10  $\mu\text{g/l}$  compared to the GWAL of 5  $\mu\text{g/l}$ ). However in samples collected in June 2006, 1,2-dichloroethane was <1  $\mu\text{g/l}$  at MW84-1S, and was not detected or detected at only 0.78  $\mu\text{g/l}$  in eastern site boundary wells (MW84-3S, M85-1S, MW85-2S, and MW85-4S) (see Attachment 6).

Semivolatile organic compounds were analyzed in a selected well east of the landfill in 2002 and 2006. No SVOCs were detected.

During the RI, concentrations of some metals exceeded the current GWALs in a number of unfiltered samples, but all metals except arsenic achieved the GWALs in filtered samples. Because of concern that filtration removes some mobile constituents in groundwater, more recent sampling events have included total metals analyses with samples collected using low flow purging methods. Metals were analyzed in samples from selected wells east of the landfill in 2002 - 2006. Arsenic, iron, lead, and thallium have been detected exceeding the GWALs. However, as displayed in the following table, the detections have varied from above to below the GWALs in samples from the same well collected on different dates, and the detections are not distributed in a manner that suggests that they are Site related (for example the maximum arsenic and iron detections have been at MW85-2S, which is a sentinel well near the eastern Site boundary, see Attachment 7).

**TABLE 1: METAL DETECTIONS IN SAMPLES FROM MONITORING WELLS  
WHERE GWALs WERE EXCEEDED FROM 2002 – 2006 (in ug/l)**

Well / Metal	GWAL	2002	2003	2004	2006
MW84-1S / Arsenic	10	<5	<2	<20	12.3
MW84-1S / Iron	1,000	880	796	1,020	3,090
MW84-1S / Lead	4	<2	<10	6.6J	<3
MW84-1S / Thallium	5	<5	101	29.9J	<1
MW90-3S / Aluminum	300	<20	347	<50	35.4J
MW90-3S / Lead	4	<2	18.8	5.7J	<3
MW90-4S / Lead	4	<2	16.8	<10	<3
MW85-2S / Arsenic	10				22
MW85-2S / Iron	1000				8020

The results suggest that the variations in detections are related to solids entrained in the groundwater samples, and not to Site contamination. In the past, CRA has redeveloped some monitoring wells to reduce solids in the samples. During 2007, the FWCC will collect background shallow aquifer samples to better evaluate the source of the metal detections.

The 2006 sampling also included analysis of cyanide, PCBs, PBBs, and pesticides in monitoring wells near the landfill. No cyanide or PCBs were detected. The only pesticide detected was aldrin, which was detected at concentrations below the GWAL, and trace concentrations (far below the GWAL) of PBBs were detected.

4. Characterization and Delineation of the North Plume: To bound the extent of vinyl chloride contamination in the deep aquifer near the western Site boundary, monitoring wells were installed in 2002 - 2003. The 2006 data indicates that the deep aquifer vinyl chloride contamination continued to be bound to the west (the down gradient groundwater flow direction in that area) by monitoring wells MW06-62D, MW06-63D, and MW06-64D (see Attachment 8). To delineate the vinyl chloride contamination in the shallow aquifer west of the lake, monitoring wells were installed in 2004 - 2007. The 2006 data indicates that the shallow aquifer vinyl chloride contamination west of the lake is bound to the west by MW06-55S and MW06-56S (see Attachment 7).

Because there was uncertainty about whether 1,2-dichloroethane or vinyl chloride was migrating off-Site in the shallow aquifer at the western Site boundary, an investigation was conducted in 2006 - 2007 including a series of vertical aquifer sampling locations followed by installation of permanent monitoring wells right near the western Site boundary. Although some vertical aquifer samples at the Site boundary exceeded the GWAL for vinyl chloride, the permanent monitoring well samples (MW07-90S, MW07-88S, and MW06-57S) were less than the GWAL (see Attachment 8). These shallow aquifer site boundary wells are included in the deep aquifer chemical oxidation performance monitoring and will be used to evaluate whether 1,2-dichloroethane and vinyl chloride are not migrating off-site in the shallow aquifer.

To better delineate the area for treatment in the shallow aquifer south and west of the lake, a series of multi-level wells were installed at about 50-foot intervals and sampled in 2006 - 2007. As a result of this sampling, the areas to be treated by in-situ chemical oxidation were determined as shown in Attachment 4. Attachment 4 also shows the location and length of the chemical oxidation treatment line to treat the deep aquifer near the western Site boundary from the design document. This treatment line will be extended if necessary based on results of sampling conducted prior to installation of the wells.

Based on the 2006 sample results, VOCs that are continuing to migrate from the landfill to the north at concentrations exceeding GWALs include: benzene; chloroethane; 1,1-dichloroethane; cis-1,2-dichloroethylene; ethyl benzene; methylene chloride; toluene; and vinyl chloride. However, concentrations have significantly decreased over the past couple of years in this area of the Site. In addition, all of these VOCs appear to significantly attenuate as they migrate away from the landfill (see Attachment 4 for 2006 vinyl chloride concentrations). Volatile organic compounds that exceeded GWALs within 300 feet of the Site boundaries based on 2006 samples include: 1,1-dichloroethane; 1,1-dichloroethylene; 1,2-dichloroethane; cis-1,2-dichloroethylene; and vinyl chloride. Only vinyl chloride has been detected in off-Site groundwater exceeding a GWAL.

Semivolatile organic compounds, metals, cyanide, pesticides, PCBs and PBBs were analyzed in groundwater samples from landfill monitoring wells and selected down gradient monitoring wells in 2006. In addition, metals were analyzed in groundwater samples from MW95-1S in 2002 - 2004. The 2002 and 2006 metals analyses included filtered metals. The results show that naphthalene, arsenic, and iron are migrating to the north in shallow groundwater from the landfill at concentrations exceeding GWALs. The naphthalene was not detected in down gradient groundwater. Arsenic and iron were detected exceeding the GWALs in groundwater to the north and northeast from the landfill. The arsenic detections exceeding the GWALs do not appear to extend off-site and are bounded by MW99-10S (see Attachment 7). Iron detections exceeding the GWALs include the area being treated near the lake. The impact of the treatment on

the iron concentrations will be monitored, and additional groundwater monitoring for iron will be added as necessary to bound the iron contamination. Arsenic and iron also appear to have migrated into the deep aquifer based on detections exceeding GWALs in the sample from MW99-6D. Next year background metal data will be collected to develop site specific background concentrations in accordance with MDEQ guidance. The background concentrations will become the GWALs if they exceed the MDEQ drinking water criteria or U.S. EPA Maximum Contaminant Level.

In the 2006 samples, vanadium was detected exceeding its GWAL in the filtered samples from landfill monitoring wells, but this appears to have been a sampling contaminant because vanadium was below its GWAL in all of the unfiltered samples. There have been some detections of lead slightly exceeding the GWAL in landfill monitoring wells. Trace concentrations (below the GWALs) of other SVOCs, 4,4'-DDE, heptachlor, and PBBs were also detected in landfill monitoring wells. No cyanide or PCBs were detected in the landfill monitoring wells.

There were what appear to be isolated detections of other contaminants exceeding GWALs in samples from certain down gradient monitoring wells, including: n-nitrosodimethylamine in MW99-7D; benzo(a)pyrene in MW99-10S; aluminum at MW01-26S and MW99-5S; MW99-6D; and MW99-10S; lead at MW99-10S; and vanadium at MW99-6D and MW99-10S. The elevated aluminum in MW99-10S and MW99-6D can be an indicator of relatively high solids in the samples, which could also explain the elevated benzo(a)pyrene, lead and vanadium detections. The chemical oxidation treatment will impact concentrations of these contaminants so concentrations of SVOCs and metals will have to be re-characterized after treatment.

In 1999 – 2002, CRA collected samples for analysis of ethane, ethylene, methane, alkalinity, chloride, dissolved organic carbon, dissolved oxygen, nitrate/nitrite, oxidation/reduction potential, sulfate and sulfide to help evaluate the extent of natural biodegradation in the groundwater. Detections of ethane, ethylene and methane indicate that anaerobic biodegradation of VOCs is occurring, especially near the landfill. Dissolved methane detections were as high as: 17,000 mg/l near the landfill; 830 mg/l near the lake; 3,500 mg/l near the western site boundary; 450 mg/l east of the landfill; and 20,000 mg/l in the deep aquifer north of the landfill.

5. Investigation of Whether the North Plume Vents to the Lake: In August 2001, CRA collected five surface water samples collected just above the sediment layer, and five pore water samples collected about one foot below the top of the sediment using a piezometer. These samples were collected in shallow groundwater near the southern shoreline of the lake, where any potential venting of the VOC contaminated groundwater detected in the shallow aquifer along the southern end of the lake was considered to be most likely. No VOCs were detected in these samples. In March 2002, CRA performed a lake bed depth survey. CRA found that much of the lake is only five to seven feet deep, but that a section of the southwest corner of the lake was

up to 25 feet deep. CRA has suggested that if there is any venting of groundwater to the lake it would most likely occur in the deep section of the lake.

In August 2002, MDEQ collected 14 surface water samples in the shallow portion of the lake, and no VOCs were detected in any of the samples. In February 2003, MDEQ collected four lake bed pore water samples in the deep portion of the lake, and no VOCs were detected in any of the samples.

Since 2001, the lake elevation has been higher than groundwater elevations in surrounding contaminated groundwater. The lake level was somewhat lower than surrounding groundwater in 1999 and 2000. This data indicates that significant venting of contaminated groundwater to the lake has been unlikely since 2001.

6. Treatment of North Plume Groundwater Near the Landfill by iSOC® or by an Air Sparging Trench, or Achieve Shut-down Criteria: CRA performed pilot testing of the iSOC® technology from June 2005 - June 2006. The iSOC® technology uses pure oxygen and a groundwater probe containing a special membrane to transfer the oxygen to the groundwater without generating bubbles. The technology is intended to result in high oxygen concentrations in the vicinity of the probes, which then disperses as the groundwater migrates down gradient. It was intended that the increase in dissolved oxygen would increase the degradation of vinyl chloride and other VOCs that are a problem near the Site boundaries.

The pilot test utilized a row of twelve iSOC® wells spaced at 15 foot intervals across the most highly contaminated portion of the plume in the shallow aquifer, and a series of up gradient and down gradient monitoring wells. There was no measurable trend in VOCs nor increase in dissolved oxygen or oxidation-reduction potential during the test within the down gradient monitoring wells. Toward the end of the test, temporary monitoring wells were placed just one foot from the iSOC® well, and still no increase in dissolved oxygen was detected. As a result, it was concluded that the iSOC® treatment would not be effective at this Site.

There have been changes in VOC concentrations in groundwater near the landfill (see Attachment 5). In 2000 - 2001, there was a sharp increase in vinyl chloride, 1,1-dichloroethane, and cis-1,2-dichloroethylene concentrations in MW95-1S. This motivated the parties to initiate evaluation of groundwater treatment at the landfill boundaries, and near the landfill. In 2003, vinyl chloride and cis-1,2-dichloroethylene concentrations decreased just as sharply in MW95-1S and have remained low. Vinyl chloride concentrations remain relatively high at the northeast corner of the landfill where vinyl chloride was detected at 510 - 690 µg/l in MW06-61S in 2006. In spite of the high vinyl chloride detections in monitoring well MW95-1S, and in MW06-61S, in 2006 vinyl chloride concentrations dropped to relatively low levels a short distance down gradient (see Attachment 4).

Following completion of the iSOC<sup>®</sup> pilot testing, the FWCC proposed to evaluate whether the following criteria from the 2005 ROD Amendment for shut-down of the landfill treatment system had already been achieved without treatment.

*It is conservatively demonstrated that natural attenuation will reduce Site boundary concentrations of all contaminants detected in the landfill monitoring wells to below the GWALs at the Site Boundaries*

If this criterion is achieved, the ROD would not require implementation of the air sparging trench to treat contaminated groundwater near the landfill. Part 201 of the State of Michigan's Environmental Remediation, Natural Resources, and Environmental Protection Act, stipulates that modeling alone is not a sufficient demonstration of compliance, and that actual groundwater data must be collected to confirm modeling predictions. The parties are in the process of evaluating whether existing data is adequate for this demonstration, and are considering whether further modeling would be helpful.<sup>1</sup>

7. Treatment of the North Plume by In-situ Chemical Oxidation Near Site Boundaries and Off-Site: The 2005 ROD Amendment provides that in-situ chemical oxidation will be performed to cut-off migration of contaminants from the landfill at the approximate locations shown in Attachment 9. The objective of each treatment line is to create a continuous treatment zone where contaminants will be oxidized, and result in meeting GWALs at the following locations: down gradient from the treatment lines; at the Site boundaries; and up gradient from the lake.

**Bench-scale testing:** Under U.S. EPA and MDEQ oversight, the FWCC performed bench scale and pilot testing using potassium permanganate as the chemical oxidant, and sampling to delineate the extent of treatment. The bench scale testing indicated that use of potassium permanganate oxidized vinyl chloride and cis-1,2-dichloroethylene, but was unlikely to oxidize 1,2-dichloroethane, which has been detected exceeding its GWAL in the shallow aquifer near the western Site boundary. Further sampling of the shallow aquifer near the western Site boundary, has indicated that 1,2-dichloroethane is not presently migrating off-Site at concentrations exceeding its GWAL. For that reason, it has not been necessary to test oxidants such as certain catalyzed peroxides and persulfates that have more potential to treat 1,2-dichloroethane, and design of the treatment system has proceeded for an injection

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<sup>1</sup> In February and March 2007, CRA submitted the results of modeling using BIOSCREEN and BIOCLOR, which are screening level models that had been endorsed by EPA. The results appeared to show that VOCs would likely degrade to below the GWALs at the Site boundaries using input assumptions approved by EPA staff, and 2006 monitoring well VOC concentrations. However, an article published in the March - April 2007 issue of *Ground Water* (published by the National Ground Water Association) identified an inherent error in the BIOSCREEN and BIOCLOR models, which could under-predict solute concentrations along a centerline of the plume by as much as 80%. Because of this finding, which has not been refuted, MDEQ staff have stated that MDEQ will not accept CRA's modeling using BIOSCREEN and BIOCLOR.

system utilizing potassium permanganate. Use of potassium permanganate has some advantages over other potential oxidants, including that it is safer to handle, and persists in the aquifer for a longer period of time and, for that reason, the treatment can take advantage of dispersion of the oxidant as it migrates down gradient from the injection locations.

Oxidant dispersal and groundwater diversion issues: In the initial pilot tests for both the shallow and deep aquifers, the potassium permanganate solution was introduced by pouring it into the injection wells. In these tests, dispersal of the oxidant in the aquifer was limited. When a shallower injection well was added for the deep aquifer pilot test and pressure injection used, it appeared that adequate dispersal was achieved. For these reasons, the injection wells will be closely spaced (10 feet apart), and all oxidant injections will be under pressure. There is also concern that the oxidant injections will divert the vinyl chloride contaminated groundwater to outside the treatment area. Conestoga-Rovers & Associates designed the injection system to inject into alternate injection points so that some of the displaced contaminated groundwater will be diverted into an area where oxidant will be present and be treated. Diversion of contaminated groundwater around the treatment area will be monitored by analyzing for VOCs in monitoring wells located peripheral to the treatment.

Treatment of the shallow aquifer south and west of the lake: After further delineation sampling in the shallow aquifer north of the landfill, it has been concluded that the landfill is no longer acting as a continuous contaminant source as had been supposed, and instead the VOC contaminant groundwater located south and west of the lake is an isolated plume. MDEQ staff expressed concern that repeated treatment south of the lake could eventually result in dissolved manganese venting to the lake. For these reasons, instead of treating the north plume in two treatment lines consisting of reusable injection wells located west and south of the lake, as was expected at the time of the 2005 ROD Amendment (see Attachment 9), CRA's design recommends treating the bulk of the VOC contamination by treating groundwater exceeding 20  $\mu\text{g/l}$  and located south and west of the lake over about a one-year period using a series of injection points arranged in lines (see Attachment 4). It is recognized that longer term treatment will be necessary because some of the VOC contamination is under the lake.

Although the oxidant injections are planned as 10 feet from the lake, it is believed that oxidant will not affect the lake because the potassium permanganate is expected to react before it travels more than 10 – 30 feet, because pore water sampling has not detected VOCs venting to the lake, and because lake water levels have been higher than groundwater levels since 2001. The oxidant injections will be performed using portable wells installed by a Geoprobe unit at 10 foot intervals along the treatment lines. The injections will be as close as 10 feet from the lake. Although complete plume treatment will be attempted, it is recognized that some of the VOC contamination is likely to be inaccessible because it is under the lake. For that reason, long-term

monitoring will be required, and groundwater treatment is likely to be extended beyond one year at some locations.

Treatment of the shallow aquifer near the western Site boundary: Vertical aquifer sampling at a series of locations in the shallow aquifer near the western Site boundary was performed to determine whether treatment of the shallow aquifer is needed on the west side of the Site. Based on the vertical aquifer sampling data, three new sentinel monitoring wells were installed to monitor for off-Site migration of VOCs in the shallow aquifer near the western Site boundary. Although vinyl chloride exceeded the GWALs in some vertical aquifer samples from the shallow aquifer near the western Site boundary, the concentrations in the groundwater samples from the three new shallow aquifer sentinel wells collected in 2007 were less than the GWALs. For this reason, U.S. EPA is not requiring treatment of the shallow aquifer near the western Site boundary at this time although some treatment of this area is likely to occur as a result of the in-situ chemical oxidation treatment of the deep aquifer near the western Site boundary. The three new sentinel wells will be used for performance monitoring for the deep aquifer in-situ chemical oxidation near the western Site boundary and for Site boundary monitoring wells.

Treatment of the deep aquifer near the western Site boundary: As a result of the pilot testing the deep aquifer treatment line will consist of a line of injection locations spaced ten feet apart. The injection will be into two depths at each location, and will initially be a quarterly interval.

Summary of concerns with the existing design: The following will be monitored so that corrective measures can be implemented, if necessary.

- off-site migration of 1,2-dichloroethane and vinyl chloride in the shallow groundwater;
- dispersal of the oxidant;
- diversion of contaminated groundwater to outside the treatment area.
- venting of oxidant to the unnamed lake.

8. Air Emissions, Landfill Gas Migration, and Vapor Intrusion: The FWCC monitored landfill gas emissions and for lateral landfill gas migration in the vadose zone quarterly from August 2005 - May 2007. Measurements were taken from ten landfill gas vents, and from nine soil gas probes surrounding the landfill. The landfill gas emission rates from the landfill vents were very low, and do not present a significant human health risk.

Some samples from two soil gas probes located on the east side of the landfill exceeded the lower explosive limit (LEL) for methane, but no or very low amounts were detected in probes on the west, north and south sides of the landfill. The LEL was exceeded during 6 of the 8 sampling events in one of the two probes, and exceeded the LEL in only one event in the other. Methane was not detected in the final 2007



sampling event in any of the probes. Because there are no buildings near the landfill, and the eastern Site boundary of the Site is 1,200 feet from the landfill, these landfill gas readings do not present a public health or safety threat. A soil gas investigation should be conducted prior to any excavation activities near the landfill. Any on-site excavation will require U.S. EPA approval, in accordance with the *Declaration of Restrictive Covenant*.

Human health risks from vapor intrusion can be screened out at this time. There is a residence near the VOC groundwater contamination near the western boundary of the Site, but in this vicinity VOCs exceed the GWALs only in the deeper groundwater. There are no residences near the VOC contamination in the shallow groundwater north of the Site (the nearest residence is 400 - 500 feet from the residence). Further evaluation of the vapor intrusion risk may be necessary if a VOC concentration exceeds a screening level defined in *OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater to Soils* (U.S. EPA, November 2002) within a distance of about 100 feet of an occupied residence, whether this results from migration of the groundwater contamination or new residential usage or development. The screening level is 2 ug/l for vinyl chloride, and 210 ug/l for cis-1,2-dichloroethylene. In 2006, there was a 2.1 ug/l detection of vinyl chloride about 400 feet in the up gradient groundwater flow direction from the residence at 13440 Harrison Street. Presently, this residence is unoccupied and is owned by the FWCC.

9. Disposal of Investigation Derived Wastes, and Rinse Water from Chemical Oxidation: According to the *Additional Investigation Work Plan* (CRA, October 1998), drill cuttings from new soil borings were required to be: placed in a roll-off box and stored on-Site; and sampled and analyzed to determine the appropriate disposal. Decontamination and purge water was required to be: contained in tanks and stored on-Site; and sampled and analyzed to determine the appropriate disposal method. Disposable safety clothing was to be containerized and stored on-Site pending appropriate off-Site disposal. These procedures were updated in the *Health and Safety Plan* (CRA, June 2006), which provides for essentially the same procedures with a little more detail. The *Additional Investigation Work Plan* provides that U.S. EPA and MDEQ will be informed of disposal methods. The *Health and Safety Plan* provides that the results from testing for disposal will be provided to U.S. EPA in Monthly Progress Reports, which are required under the Consent Decree, and that U.S. EPA will be provided with copies of waste manifests.

During work on this five-year review, the RPM realized that U.S. EPA had not been informed of either disposal methods or waste testing results. In response to this, the RPM requested disposal information from CRA. Conestoga-Rovers & Associates sent a letter dated June 26, 2007 (see Attachment 10) informing U.S. EPA that all wastes were disposed on-site between March 2002 and March 2007; summarizing how the wastes were handled, tested, and disposed; and attaching the testing results. Later CRA sent an e-mail showing where the soil and waste waters were disposed on-site

(Attachment 11). From information provided by CRA, it is estimated that CRA generated approximately 3,000 cubic feet of soil cuttings from 1998 - 2007, and 14,000 gallons of waste water from 2002 – 2007.

Wastes were from drilling, decontamination, development, and sampling. Based on information in CRA's letter, the soil cuttings, and waste water were properly handled and stored on-site, but were not properly tested or evaluated for on-site disposal. Soil samples were collected from the roll-off boxes and drums, analyzed for leaching of VOCs and metals using the Toxicity Characteristics Leaching Procedures, and the results compared to concentrations for RCRA hazardous waste by characteristic. Similarly, the waste waters were sampled, analyzed for VOCs and metals, and compared to RCRA characteristic concentrations. Because the detections were less than the RCRA characteristic concentrations, CRA spread the soil cuttings on the top of soil south of the landfill within the landfill fence, and released the waste water from the polytanks where they were located within the landfill fence and allowed the water to infiltrate.

For future work, U.S. EPA is requiring that waste water be analyzed in accordance with procedures approved for groundwater samples in the 2007 *Quality Assurance Project Plan*, and on-site disposal will be allowed only if detections are less than the GWALs. For soils, testing must indicate that concentrations are less than the Michigan residential screening levels. These requirements have been incorporated into the design documents for the chemical oxidation treatment. In addition, CRA has committed to submitting future soil cutting and waste water testing results and any waste disposal manifests to U.S. EPA in its monthly progress reports.

Relative to CRA's past disposal, the testing results in Attachment 10 indicate that the analytical detection limits exceeded the GWALs for most of the parameters, and, therefore, the laboratory analyses were not sensitive enough to evaluate achievement of the GWALs. The test does indicate that lead exceeded its GWAL in the TCLP from one soil sample; benzene exceeded its GWAL in the TCLP from another soil sample; and benzene exceeded its GWAL in one wastewater sample. In spite of these concerns, U.S. EPA has decided that no action is needed to address the past disposal of soil cuttings and waste water within the landfill fence for the following reasons:

- all of the boreholes were outside of the landfilled area, where no known hazardous waste disposal occurred;
- except near the landfill, the only contaminants of concern are VOCs in groundwater and in soils below that water table;
- the fate of the VOCs from the disposal would be either to volatilize, degrade, or infiltrate into groundwater where it is already contaminated and is being monitored;

- borings and groundwater from near the landfill had some metal and SVOC contamination, but the concentrations would not have been high because it resulted only from groundwater migration; and
- because the soil cuttings were spread on the surface within the landfill fence and the waste water released within the landfill fence, there should be very limited direct human contact with these soils.

### **Institutional Controls (ICs)**

Compliance with ICs is necessary to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure. U.S. EPA conducted a review of the ICs and has determined that they are adequate to protect human health and the environment. As part of this five-year review, U.S. EPA performed the following activities related to the IC evaluation:

- a preliminary review of the *Declaration of Restrictive Covenant* dated July 12, 2002;
- interviews with the Forest Township Supervisor;
- interviews the GCHD;
- a Site inspection;
- mapping the IC areas and comparing those areas with the area where the *Declaration of Restrictive Covenant* applies;
- evaluating the effectiveness of the ICs;
- incorporating IC monitoring into the OMMP with agreement from the FWCC ; and
- developing an IC Communication Plan in cooperation with the FWCC, the GCHD, and Forest Township.

Each area where ICs are necessary to assure protectiveness is identified in Table 2 and Attachment 12. Institutional controls include a *Declaration of Restrictive Covenant* dated July 12, 2002, which is filed with the chain-of-title for the Site property (Attachment 13); Forest Township ownership of the Site property, and access permit system; and Chapter 4 of Genesee County Health Regulations requiring a permit prior to well installation. Access controls through fencing, and security measures are also measures necessary to assure protection. The IC evaluation is summarized in the following table and is further discussed on the following page.

**TABLE 2: SUMMARY OF ICs**

<b>Media/Areas That Do Not Support Unrestricted Use / Unlimited Exp.</b>	<b>IC Objective</b>	<b>Access Control / Title of IC Instrument in Place</b>
Groundwater and soil in Landfill area	Permanently prevent access, and disturbance or removal of soil and groundwater except as needed for maintenance.	Fence and warning signs around landfill; <i>Declaration of Restrictive Covenant</i> , July 12, 2002; Forest Township ownership, and access permits.
Groundwater and soil from Site property outside of landfill area	Restrict usage and activities to those that do not interfere with remedy, and that are consistent with cleanup criteria. Prevent construction, and soil and groundwater removal except for monitoring and testing unless approved by U.S. EPA and MDEQ.	Fence and warning signs around original Site, but not around additional 80 acres (except for deep aquifer injection area); <i>Declaration of Restrictive Covenant</i> , July 12, 2002; Forest Township ownership, and access permits.
CAA, and PRA	Restrict installation of new groundwater pumping wells, and extensive changes to existing water supply wells.	Chapter 4 of Genesee County Health Regulations requiring permit prior to well installation; U.S. EPA notice to well drillers.

The landfill area is enclosed in a six-foot chain-link fence with 3 strands of barbed wire, and is posted with warning signs. The original Site area (not including the 80 acres) is also enclosed with a six-foot chain-link fence with 3 strands of barbed wire and is posted with warning signs. Ownership of the Site property was transferred to Forest Township in 1999. Inasmuch as the Township owns the property, it has direct control over how and whether it is redeveloped. Forest Township issues permits for usage of the property outside the landfill. Forest Township has reported that parts of the Site are used for model airplane flying, archery, and paintball, but recently reported removal of some barbed wire and trespassing within the fenced area outside of the landfill. This usage and conditions of the Site were confirmed by the RPM during his Site inspection for this five-year. U.S. EPA will send a letter to the FWCC requiring that the barbed wire be replaced where it has been removed, in order to minimize trespassing. Presently the Site property is zoned for residential and agricultural usage, but the Township Supervisor stated that she is planning to propose that Site zoning be changed to recreational.

The *Declaration of Restrictive Covenant* for the Site property is on file at the Genesee County Register of Deeds. The *Declaration of Restrictive Covenant* states that the

restrictions run with the land. U.S. EPA mapping work confirmed that the property description in the *Restrictive Covenant* applies to the proper locations.

In 2005, the RPM contacted the GCHD and learned that GCHD regulations require a permit from the County prior to installation of new water supply wells, and that the County can restrict installation of new water supply wells in areas of groundwater contamination (see Attachment 14, Chapter IV of the Genesee County Environmental Health Regulations). GCHD officials agreed to work with U.S. EPA staff to use GCHD regulations to restrict installation of new wells in areas that could draw in groundwater contamination, and the 2005 ROD Amendment provides for this usage of GCHD regulations. The FWCC conducted modeling to better delineate the area where groundwater usage should be restricted. The final recommended restriction areas are shown in Attachment 12.

At the request of the GCHD, U.S. EPA worked with CRA to develop recommended installation procedures for residential wells in the CAAs, and in the PRAs. In a letter dated June 5, 2006, U.S. EPA transmitted the recommended residential well installation procedures to the GCHD along with a map showing the recommended CAAs and PRAs. Among other requirements, U.S. EPA recommended that any new residential wells within the CAA be double cased and screened in the bedrock aquifer, and within the PRA be screened in the bedrock aquifer using specific construction techniques. U.S. EPA asked that any request for a high capacity well within the pumping restriction area be forwarded to U.S. EPA for review. At the request of the GCHD, U.S. EPA mailed a notice to all water well contractors registered in the State of Michigan identifying the groundwater restriction areas, summarizing special water well construction techniques required in those areas, and providing contacts for further information.

The OMMP describes the support that the FWCC agreed to provide to U.S. EPA for monitoring the ICs. The FWCC will conduct biannual inspections of the Site, including the fencing and warning signs. The results of these inspections will be reported to U.S. EPA in monthly progress reports that are required in the Consent Decree. The FWCC will conduct an annual evaluation of the effectiveness of ICs and provide the results to U.S. EPA with the annual groundwater monitoring report. The report on the ICs will include:

- identification of unexpected new construction or development in the CAA or the PRA;
- a summary of field observations (routine and major damage and repairs to fence and warning signs, evidence of improper site usage, and new construction observed in the CAA or the PRA);
- results of an annual inspection of Site property deeds for alterations and confirm any changes with Forest Township
- an evaluation of whether the deed restrictions “run with the land”;

- results of an annual interview with Forest Township staff for updated information on usage of the Site and access restrictions;
- results of an annual interview with the GCHD staff regarding implementation of their well permit program to restrict usage of groundwater in the CAA and PRA;
- results of annual interviews with parties affected by the government controls such as property owners and residents within the CAA or the PRA, water well contractors, and parties who have permission from Forest Township to use the Site property;
- annual questionnaires sent to residential well owners;
- explanation of where information can be obtained about government controls;
- explanation of how affected parties such as property owners, contractors, and resource users obtain information about the governmental controls;
- a discussion of whether there are measures in place to ensure that modifications to the ICs require U.S. EPA and MDEQ approval;
- an evaluation of whether Forest Township is aware of and is enforcing compliance with the *Restrictive Covenant* and whether the property is being used in a manner consistent with the *Restrictive Covenant*;
- an evaluation of whether the GCHD is restricting well installations in accordance with the 2005 ROD Amendment;
- an evaluation of whether affected parties were aware of and understand the government restrictions;
- an explanation of any lapses in enforcement of the government controls and deed restrictions and of how these lapses were addressed;
- an overall assessment of the short-term and long-term effectiveness of the ICs, including consideration of the following: whether existing ICs are protecting public health; changes in land and resource use; whether the current or expected land use is consistent with a county master plan; whether Forest Township has any plans to sell, transfer to change the usage of the property; the potential impact of new development; how current land and resource usage relates to exposure assumptions and risk calculations used in the ROD; any unintended consequences resulting from a particular usage restriction;
- propose necessary corrections / extensions to existing ICs and monitoring procedures;
- an annual certification to U.S. EPA that the ICs are in place and remain effective.

During the next IC review, the parties need to focus review on the enforceability of the *Restrictive Covenant*. U.S. EPA and MDEQ are now in the process of developing language to ensure the enforceability of restrictive covenants.

Institutional control monitoring is also conducted through periodic walk through inspections by Forest Township. The OMMP includes an IC Communication Plan (see Attachment 15). In addition to previously mentioned requirements, FWCC agreed to send monthly progress reports to Forest Township, and to immediately report major

damage to the fence or landfill, and evidence of improper usage of the Site to U.S. EPA, MDEQ and Forest Township. The Forest Township Supervisor agreed to report major changes in Site usage or development, major development in the vicinity of the Site, major damage to fences, and evidence of improper Site usage to U.S. EPA, MDEQ and the FWCC. The GCHD agreed to report plans for major construction or development in the CAA or the PRA, and major changes in their regulations or permit program to U.S. EPA, MDEQ and the FWCC.

### **System Operation / Operation and Maintenance**

Operation and maintenance of the landfill cap and fence was in accordance with the landfill O&M plan in the *Final Design Report* (McClaren Hart, August 1995), until it was replaced by the OMMP. In accordance with these plans, the landfill cap and fence have been inspected twice per year and repaired when necessary. Maintenance has also included cutting vegetation twice per year. The OMMP also includes criteria and procedures for periodic maintenance of the groundwater monitoring wells. Procedures for operation and maintenance of the groundwater treatment systems will be included in the final design documents for those systems.

### **V. Progress Since the Second Five-Year Review**

All issues and recommendations included in the *Second Five-Year Review Report* have been addressed, as summarized in the following table.

**TABLE 3: SUMMARY OF DISPOSITION OF ISSUES AND RECOMMENDATIONS  
MADE IN THE SECOND FIVE-YEAR REVIEW REPORT**

<b>Issue</b>	<b>Recommendations</b>	<b>Party</b>	<b>Action Taken and Outcome</b>	<b>Date of Action</b>
North plume not fully characterized	Complete delineation of north plume, and develop new long-term monitoring plan	FWCC	North plume investigated in phases. OMMP approved.	1995 – 2007
Options for remediation of the north plume need to be evaluated	Evaluate options for remediation of north plume	FWCC	<i>Remedial Alternatives Evaluation Report completed, and pilot testing performed</i>	2001 – 2007
Unclear whether PBB detection limit is low enough	Evaluate whether PBB detection limit is low enough	FWCC	PBB analytical procedure updated QAPP	March 2006

<b>Issue</b>	<b>Recommendations</b>	<b>Party</b>	<b>Action Taken and Outcome</b>	<b>Date of Action</b>
Risks from landfill gas emissions not evaluated	Measure and evaluate risks from landfill gas emissions	FWCC	Developed and implemented plan to measure and evaluate landfill gas emissions	2003 – 2007
Risks from landfill gas migration in subsurface not evaluated	Measure and evaluate risks from landfill gas migration	FWCC	Developed and implemented plan to measure and evaluate landfill gas migration	2003 – 2007
Concern about groundwater usage off-site	Continue annual sampling of existing residential wells	FWCC	Continued annual sampling of residential wells	1999 - ongoing
	Implement ICs to restrict groundwater usage	U.S. EPA / GCHD	Restricted installation of new wells using GCHD regulations	2005 - ongoing

## **VI. Five-Year Review Process**

### **Administrative Components**

Michigan Department of Environmental Quality, CRA, the FWCC, Forest Township, and the GCHD were notified of the start of the five-year review process in a letter from U.S. EPA dated February 7, 2007. This five-year review report was drafted by Richard Boice, who has been RPM for this Site since December 1998. Other U.S. EPA staff having input into this review included: Luanne Vanderpool, Ph.D, Hydrogeologist; Arunas Draugelis, Ph.D, Toxicologist; Sheri Bianchin, RPM; U.S. EPA Region 5's Office of Regional Council; and U.S. EPA headquarters staff. Ron Novak and Robert Paulson of CRA provided support for community relations work for the public notices, fact sheet, and public meeting. Michigan Department of Environmental Quality staff having input into this review included Deborah Larsen, MDEQ's site manager; William Bolio, Hydrogeologist; James Heinzman, and Superfund Section management. In addition, the FWCC, and CRA have had input into this review.

On May 31, 2007, a draft five-year review report was be distributed to MDEQ, the FWCC, CRA, the GCHD, Forest Township, Dr. Luanne Vanderpool, and Dr. Arunas Draugelis. Comments were received as follows: from Dr. Luanne Vanderpool in a June 15, 2007 memorandum; from the FWCC in a July 3, 2007 e-mail; from Dr. Arunas Draugelis in a July 17, 2007 e-mail; from MDEQ in July 16, 2007 and August 13, 2007 letters and an August 21, 2007 e-mail. A letter from CRA dated June 26, 2007, along with e-mail messages dated August 2 responded to U.S. EPA's concerns about the disposal of soil cuttings and waste water. Input regarding the IC evaluation was received from U.S. EPA Region 5's Office of Regional Council during a discussion on



August 7 and an August 14, 2007 e-mail; and from Sheri Bianchin in e-mails dated August 13 and September 4, 2007.

### **Community Notification and Involvement**

The RPM has annually sent letters to the residential well owners on their well sampling results, and provided updates on the Site investigations. As part of the 2005 ROD Amendment process, U.S. EPA distributed a fact sheet in June 2005, and held a public meeting on July 20, 2005, and distributed a fact sheet on the Selected Remedy in December 2005. At the public meeting and in comments, some members of the community expressed frustration at the length of time that the cleanup has taken. Some members desired more certainty about U.S. EPA's preferred alternative, and others favored complete removal of the landfill. There were concerns expressed about protection of nearby residents, property values, ecological impacts, new development and use of private parties for cleanups. There were requests for specific sampling and for more frequent updates from U.S. EPA. U.S. EPA responded to each of the public comments in the Responsiveness Summary, which is part of the 2005 ROD Amendment. Because of the level of public interest expressed during the public meeting, U.S. EPA committed to conduct another public meeting when the design was finished.

On March 19, 2007, U.S. EPA published a notification of the start of the five-year review in the Flint Journal (see Attachment 16). On August 10, 2007, U.S. EPA distributed a fact sheet on design of the chemical oxidation system, updates on other issues, and announcing an August 22 public meeting. On August 14, 2007, U.S. EPA published a notice for a public meeting on August 22nd, in the Flint Journal. The August 22nd public meeting was attended by 30 to 40 people, and was well received. A notification of completion of this five-year review will be published in a local newspaper of general distribution. A copy of the final five-year review report will be made available in the local repository at the Forest Township Library, 130 East Main Street, Otisville, Michigan, and at the U.S. EPA, Region V Records Center, 77 W. Jackson Blvd., Chicago, Illinois. Copies can also be provided to other interested parties.

### **Document Review**

Documents consulted for preparation of this report are listed at the end of this report.

### **Data Review**

See Section V of this report.

## **Site Inspection**

A Site inspection was conducted by the RPM and Robert Paulson of U.S. EPA, and Michael Mateyk of CRA on August 22, 2007. The locations of various monitoring wells, the site of the chemical oxidation pilot tests, and the multi-well sampling locations near the lake were observed in the 80 acre area north of the landfill and off-Site on the former Burns property. The location used for archery practice was observed.

Next the inspectors observed the landfill area. The landfill was well vegetated, the landfill vents were unobstructed, and there were no erosion problems. The 6 foot chain link fence with 3 strands of barbed wire and warning signs around the landfill and the iSOC<sup>®</sup> area were in place, well maintained, and the outer gates were locked. Poly tanks to hold waste water were observed in the iSOC<sup>®</sup> area, and south of the landfill. The tank south of the landfill was half full of water and had a depression on top; so the water could be from precipitation. Empty drums from soil cuttings were observed, and the area where soil cuttings were spread south of the landfill was observed. One barrel containing soil, and labeled as containing soil cuttings from 8-9/2006 and 5/2007 was observed.

Finally the inspectors observed the area east and south of the landfill, and the outer six foot fence chain link fence with three strands of barbed wire, and warning signs around the original Site (not including the additional 80 acres). The outer fence and warning signs were well maintained except that barbed wire had been removed along about fifty feet at the eastern boundary gate, and near the southern gate. This indicates that unauthorized entry had occurred. East of the landfill is a mowed field used by the model airplane club. East and south of the landfill various wooden structures, piles of tires, and a trailer, all apparently used by paint ball players were observed. Two roll off boxes containing insulation and construction debris were observed south of the old hanger building. Another building near the south gate, which we understand is used by the model airplane club, had been vandalized with broken windows and graffiti.

U.S. EPA will send a letter to the FWCC regarding the need to repair the barbed wire, and disposal of the wastewater and soil still within the landfill fence.

## **Interviews**

The RPM routinely discusses Site issues with staff of CRA, who have been under contract with the FWCC to perform the investigations, pilot studies, and evaluations. During 2005 - 2007, the RPM periodically corresponded by telephone with Jim Helmstetter, Director of the Environmental Health Division of the GCHD, to set up the government controls on new well installations in the CAA and the PRA. The RPM also visited the GCHD and Forest Township staff on July 20, 2005, during the trip for the public meeting. In February 2007, after working out a draft IC communications plan with CRA, the RPM sent a copy to Forest Township and the GCHD, and confirmed that

the plan was acceptable to them in telephone conversations with Valerie Pace, Forest Township Supervisor, and with Greg Compata of the GCHD.

On August 14 and 22, 2007, the RPM talked to Valerie Pace, Forest Township Supervisor. Ms Pace said that she periodically conducts a walking inspection of the Site property. She said that she had observed no problems at the Site, except yesterday when she saw that the barbed wire had been cut on the outside fence, and that windows had been broken and gang symbols written on one of the old buildings. She said that she would report it to the FWCC. Ms Pace provided the RPM with a zoning district map showing that the Site is part of the area zoned residential / agricultural. Ms Pace said that she is planning to propose that the zoning of the Site area be changed to recreational.

During the public meeting on August 22, 2007, Jim Helmstetter of the GCHD said that there had been no applications for pumping wells in the PRA or CAA.

## **VI.I. Technical Assessment**

**Question A:** Is the remedy functioning as intended in the decision documents?

Yes, for completed actions including: the 1988 - 1989 lagoon removal (OU#1); the 1989 - 1993 hot-spot removal from the landfill (OU#2); and the 1995 - 1997 landfill cap and fence construction (OU#2). It also applies to continuing actions to maintain the fence and landfill cap maintenance (OU#2).

Yes also applies to the east plume monitoring (OU#2), the north plume investigation and monitoring (OU#2), the ICs, and to actions added in the 2005 ROD Amendment (OU#2), except as explained in items 1 and 2 on the following page. Groundwater investigations from 1996 – 2007 have resulted in delineation of the north plume, and provided information for design of the groundwater treatment systems. Long-term groundwater monitoring has been initiated. The designs for treatment of groundwater using in-situ chemical oxidation near the site boundaries and off-site have been completed and treatment will be initiated during 2007. Although we have not implemented groundwater treatment near the landfill, monitoring of groundwater north of the landfill has demonstrated significant decreases in the VOCs of concern, and the FWCC will evaluate whether the existing data indicates that natural attenuation is reducing contaminants to below their GWALs before reaching the site boundary. Prior to this five-year review, CRA had not been keeping U.S. EPA and MDEQ informed regarding its disposal of soil cuttings and waste water, and its testing and evaluation procedures were inadequate, but this deficiency has been corrected. ICs are in place, and have been and are expected to continue to be effective in restricting access and usage of the Site, and groundwater usage in the CAA and PRA. There will be annual evaluations of ICs.

1. In an August 13, 2007 letter, MDEQ identified concern that dissolved methane was not included in the OMMP. Dissolved methane can cause an explosion and flammability hazard if pumping wells are screened in the affected groundwater. Screening levels for this hazard include: 10,000 ug/l (United States Geological Survey); and 520 mg/l (MDEQ). As previously noted, dissolved methane detections were as high as: 17,000 mg/l near the landfill; 830 mg/l near the lake; 3,500 mg/l near the western site boundary; 450 mg/l east of the landfill; and 20,000 mg/l in the deep aquifer north of the landfill. Presently there are no residential wells that are affected by the Forest Waste groundwater contamination, and installation of new pumping wells in affected areas would be prohibited through the Genesee County Health Department regulations. However, because on-site methane detections exceed the screening values, dissolved methane needs to be added to the long term monitoring in order to assure that a fire or explosion hazard does not exist in case pumping wells are installed off-site after completion of the cleanup.

2. In the same August 13, 2007 letter, MDEQ notified U.S. EPA that monitoring groundwater for indications that potassium permanganate entering the surface water is required by State of Michigan law. Michigan Department of Environmental Quality stated that this could be accomplished by monitoring between the injection points and the lake. Inasmuch as all other design details had been agreed upon, in an August 21, 2007 letter, U.S. EPA approved for the FWCC to proceed with the oxidant injections in the three injection lines west of the lake. These three injection lines are 75 feet or more from the lake and in the down gradient flow direction from the lake, and, therefore, there is no concern that oxidant injections along these lines will enter the lake. In addition, treatment along these three injection lines should be implemented as soon as possible to prevent further down gradient migration of the groundwater contamination. In the meantime, U.S. EPA will work with MDEQ to address their concerns and requirements.

**Question B:** Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?

Yes. U.S. EPA's selected remedy was recently updated in the 2005 ROD Amendment. Since 2005, there have been no physical changes to the Site that would affect the protectiveness of the remedy, and there have been no significant updates to U.S. EPA's procedures for estimation of rates of exposure. The 2005 ROD Amendment included updating the GWALs for protection of human health for residential groundwater usage, and for protection of human health and the environment from contaminated groundwater venting to surface water.

Data and information on the remaining soil and waste contamination confirm that the property usage restrictions provided for in the ROD and that are presently in place are necessary and adequate to protect human health and the environment. It is well

documented that contaminated materials remain in the landfill under the cap, but that soil contamination is low outside of the landfill area. The landfill cap and landfill fence must be maintained, and access and usage restrictions enforced to prevent unacceptable risks from exposure to the landfill contents. The Site area outside of the landfill is being adequately restricted to recreational activities through Forest Township's usage permits. The 80-acre parcel added to the Site definition in 2005, is not fenced because there is no evidence of hazardous substance disposal in this area. Usage of this 80-acre area only needs to be restricted for groundwater usage and to prevent interference with the remedy.

Although it is unlikely to be necessary, in the OMMP the FWCC agreed to replace any existing residential well that it is screened in a contaminated aquifer where contamination could reach the well within five years. This exceeds the requirement in the 2005 ROD Amendment, which provides a contingency to replace any residential well if a contaminant from the Site or a contaminant introduced as a result of the groundwater treatment is confirmed to be detected exceeding a GWAL in the well water. In all likelihood, the *Restrictive Covenant*, GCHD regulations, long-term groundwater monitoring, in-situ chemical oxidation, and ongoing residential well sampling will provide adequate protection from usage of contaminated groundwater. In spite of this, a selection of these wells will be sampled annually.

For protection for residential groundwater usage, the GWALs in the 2005 ROD Amendment were set at the most stringent of the following: MCLs; Michigan Generic Residential Drinking Water Criteria (MDWC) listed in Michigan Rule 299.5710; and the October 2004 update of the Region 9 Preliminary Remediation Goals (PRGs) adjusted to the  $1 \times 10^{-4}$  cancer risk level (to be consistent with the 1988 ROD provisions). For most of the contaminants, GWALs were set at the MDWC. Consistent with the 1988 ROD, the GWALs apply to groundwater at and beyond the Site boundaries. There have been no changes to the MCLs since September 2005. The last update of the MDWC is dated January 23, 2006, and contains no updates to the criteria used for in the ROD Amendment, except that the MDWC for arsenic was reduced from 50 ug/l to 10 ug/l, which is equal to the MCL, which was used in the 2005 ROD Amendment. The PRGs have not been updated since October 2004, and based on a search of U.S. EPA's Integrated Risk Information System (IRIS) none of the PRGs would be made more stringent as a result of toxicity factor updates in IRIS.<sup>2</sup>

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<sup>2</sup> The IRIS oral reference dose for toluene was made more stringent on 9/23/2005 (0.08 mg/kgd compared to the 0.2 mg/kgd used for calculation of the PRGs), but on the same date IRIS made the inhalation reference dose less stringent (1.4 compared to 0.11 mg/kgd for calculation of the PRG). The resulting PRG from these changes in toxicity factor would be less stringent because the risks from toluene contamination from residential water usage are predominantly from vapor inhalation.

For protection of human health and the environment from contaminated groundwater venting to surface water, the updated GWALs were the Michigan Groundwater Surface Water Interface process (MGSI), and the Criteria for Continuous Concentrations (CCCs from the *National Recommended Water Quality Criteria:2002*, EPA-8220-R-02-04, November 2002). These GWALs apply in groundwater up gradient from where it may vent to surface water, such as the lake and the wetlands. If a generic MGSI or CCC is exceeded, MGSI regulations will be used to refine these concentrations to account for dilution and other site specific conditions. Since the 2005 ROD Amendment, neither the generic MGSIs, the MGSI process, nor the CCCs for contaminants detected near the lake or wetlands have been made more stringent.

This five-year review identifies the need to monitor for dissolved methane in order to prevent a fire or explosion hazard in case a new pumping well is installed in the affected groundwater. U.S. EPA intends to use the screening level recommended by the United State Geological Survey or MDEQ to assess the potential for dissolved methane to cause a risk.

The *Second Five-Year Review Report* included a screening level evaluation of the current and future risks from exposure to soil in the approximate 96 acres outside of the landfill and the 80-acre parcel, which confirmed that there is no significant health risk from exposure to soils from the recreational activities allowed by Forest Township. This conclusion was reinforced in the 2005 ROD Amendment where the 96 acres were determined to be safe for the limited recreational usage that is being allowed by Forest Township because contact with the soil is limited and infrequent. The *Second Five Year Review Report* noted that systematic sampling and evaluation would be advisable before extensive development of the Site outside of the landfill area occurs, to better characterize arsenic concentrations, and subsurface contamination in areas where excavation would occur. In addition, the potential for vapor intrusion should be evaluated prior to any development.

Screening of the PRGs used for the second five-year review indicates that the soil risk screening evaluation does not need to be updated. The evaluation was conducted by comparing data from soil samples collected outside of the landfill area to PRGs for residential soil exposure, and for metals to the range of background soil concentrations. The only organic compounds detected in these surface soil samples were: 2-butanone; chlordane; DDT; DDE; and endosulfan, and that all of these detections were below the November 22, 2000 PRGs. According to IRIS, there have been no significant updates making the toxicity factors for these contaminants more stringent. Of the metals in soil, only arsenic exceeded both its soil PRG and the range of on-Site background

concentrations.<sup>3</sup> According to IRIS, none of the toxicity factors for metals have been made more stringent since November 2000.

The investigation of landfill gas emissions, and landfill gas migration has confirmed that no further actions are needed at this time to control these potential exposure pathways. In the future, a soil gas investigation should be conducted if there is ever any excavation in the vicinity of the landfill. The screening level evaluation for the vapor intrusion pathway has confirmed that no action is needed at this time to control this exposure pathway other than continued groundwater monitoring.

This review included revisiting the ecological evaluation from the second five-year review, and corroborates the decision in the 1988 ROD that no action would be taken to address water or sediments near the Site. In the second five-year review, a screening level evaluation was conducted which included assessment of surface water, sediment and mammalian data from the RI, as well as fish tissue and chronic toxicity testing using *C. dubia*. This review confirmed the conclusion of the second five-year review that the data sufficiently demonstrated that there was no significant identifiable ecological impact from the Site, and that further evaluation of ecological risks are not warranted.

**Question C:** Has any other information come to light that could call into question the protectiveness of the remedy:

No. All significant information available has been assessed.

## VIII. Issues

**TABLE 4: ISSUES**

Issue	Currently Affect Protectiveness (Y/N)	Affect Future Protectiveness (Y/N)
1. On-site groundwater exceeds screening criteria to prevent fire and explosion risks from dissolved methane if pumping wells are installed in the future, and the long-term monitoring plan does not include monitoring for dissolved methane.	N	Y

<sup>3</sup> It appears possible that more extensive sampling would demonstrate that the on-Site arsenic concentrations are within Site-specific background concentrations for the following reasons: Surface soil arsenic detections were within the range of concentrations typical of U.S. soils (1-50 mg/kg according to Table 4-6 of the RI; and the sample locations of the two highest arsenic detections do not appear to be in locations likely to have been impacted by the known or suspected disposal.

Issue	Currently Affect Protectiveness (Y/N)	Affect Future Protectiveness (Y/N)
2. There may be a need to monitor for oxidant entry into the lake during in-situ chemical oxidation treatment near the lake.	N	Y

## IX. Recommendations and Follow-up Actions

**TABLE 5: RECOMMENDATIONS**

Issue	Recommendations / Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Y/N)	
					Current	Future
1	Add dissolved methane to the long-term monitoring.	FWCC	U.S. EPA / MDEQ	12/30/07	N	Y
2	Proceed with treatment in locations where entry into the lake is not a concern, and delay treatment in other locations until monitoring requirements are defined.	FWCC	U.S. EPA / MDEQ	8/21/07	N	Y

## X. Statement on Protectiveness

The remedy for OU#1 (lagoon removal action) was completed in 1989 and is protective of human health and the environment from the former contents of the lagoons.

The remedy for OU#2 (landfill and groundwater) is expected to be protective of human health and the environment upon attainment of the GWALs through groundwater treatment, and natural attenuation (OU#2). In the interim, exposure pathways that could result in unacceptable risks are being controlled through maintenance of the fencing and landfill cap, monitoring, institutional controls, and a contingency to replace residential wells. To assure protection to human health and the environment, monitoring for dissolved methane will be added to the long-term monitoring plan, and the monitoring requirements for oxidant entering the lake will be defined before in-situ chemical oxidation is conducted near the lake.

The overall selected remedy is protective of human health and the environment in the short term and will be protective in the long-term upon attainment of the GWALs for OU#2.



## **XI. Next Five-Year Review**

The next five-year review is scheduled to be conducted by September 2012.

## **DOCUMENTS CONSULTED FOR THIRD FIVE-YEAR REVIEW**

*Record of Decision Operable Unit Alternative Selection*, U.S. EPA, June 30, 1986.

*Remedial Investigation Report*, CH2M-Hill, August 28, 1987.

*Declaration for Record of Decision Forest Waste Disposal, and Summary of Remedial Alternative Selection Forest Waste Disposal*, U.S. EPA, March 31, 1988.

*Explanation of Significant Differences*, U.S. EPA, May 4, 1993.

Forest Township Zoning District Map, Forest Township, September 12, 1996,

*Additional Activities Work Plan*, CRA, October 1998.

Letter re: Monthly Progress Reports, CRA, 2002 – 2007.

*Declaration of Restrictive Covenant*, Forest Township, July 12, 2002.

*Second Five-Year Review Report for Forest Waste Disposal Site*, U.S. EPA, September 30, 2002.

*Genesee County Environmental Health Regulations*, Chapter IV, October 2002.

Letter re: Comments on final five-year review document, MDEQ, January 30, 2003.

*2002 Interim Groundwater Monitoring Report*, CRA, July 2003.

*Summary Report Additional Investigations – North Plume*, CRA, October 2003.

*Remedial Alternatives Evaluation Report*, CRA, September 2004.

*2003 Additional Activities and Interim Groundwater Monitoring Report*, CRA, October 2004

*2004 Interim Groundwater Monitoring and Additional Activities Report*, CRA, March 2005.

*Bench-Scale Treatability Study Report and Shallow Aquifer Pilot-Scale Work Plan*, CRA, May 2005.

Letters re: Landfill gas investigation, CRA, September 2005 – March 2007.

*EPA Superfund Record of Decision Amendment, Forest Waste Disposal Site, U.S. EPA, September 29, 2005.*

*Shallow Aquifer In Situ Chemical Oxidation (ISCO) Pilot-Scale Test Report, CRA, December 2005.*

*Methane in West Virginia Ground Water, United States Geological Survey fact sheet, January 2006.*

Letter re: iSOC<sup>TM</sup> pilot test interim report, CRA, January 10, 2006.

*Threshold Pumping Rate and Pumping Restriction Area Modeling Report, CRA, May 2006.*

*Threshold Pumping Rate and Pumping Restriction Area Modeling Report, CRA, May 2006.*

Letter re: Deep aquifer ISCO pilot-scale test interim report, CRA, June 1, 2006.

*Health and Safety Plan, CRA, June 2006.*

Letter re: Residential well installation protocols, U.S. EPA, June 5, 2006.

*In Situ Oxygen Curtain (iSOC<sup>TM</sup>) Pilot-Scale Test Report, CRA, July 2006.*

Memoranda registered well drillers re: Restrictions on water supply wells, U.S. EPA, July 10, 2006.

Letter re: Deep aquifer ISCO pilot-scale pressure injection test report, CRA, August 24, 2006.

*2006 Groundwater Monitoring Report, CRA, September 2006.*

Institutional Control Review, U.S. EPA, November 28, 2006.

*Remedial Design / Remedial Action Work Plan, CRA, February 2007.*

*Operation, Maintenance, and Monitoring Plan, CRA, February 2007.*

*2006 Groundwater Monitoring Report, CRA, February 2007.*

*Shutdown Criteria Modeling Report, CRA, February 2007.*

Letter re: Notification of five-year review start and other activities, U.S. EPA, February 7, 2007.

Conversation Record re: Forest Waste IC communications plan, U.S. EPA, February 7, 2007.

Letter re: Deep aquifer ISCO pilot-scale contingency pressure injection test report, CRA, February 12, 2007.

*Shallow Aquifer In Situ Chemical Oxidation Pre-Design Investigation Report*, CRA, February 2007.

Conversation Record re: Forest Waste IC communications plan, U.S. EPA, February 15, 2007.

*Shallow Aquifer Western Site Boundary Investigation Report*, CRA, March 2007.

Letter re: Responses to comments, CRA, March 7, 2007.

Newspaper notification re: start of U.S. EPA five-year review, Flint Journal, March 19, 2007.

Letter re: Five-year review, MDEQ, May 4, 2007.

*2007 Landfill Gas Monitoring Summary Report*, CRA, June 2007.

Memorandum re: five-year review, U.S. EPA, June 26, 2007.

Letter re: investigation derived waste, CRA, June 26, 2007.

E-mail re: Questions for Third Five-Year Review Report, U.S. EPA, June 26, 2007.

E-mail with attachment re: CRA/FWCC Comments on the draft Five-Year Review Report; Honigman, Miller, Schwartz & Cohn, July 3, 2007.

E-mail re: Third Five-Year Review Report, U.S. EPA, July 17, 2007.

Letter re: third five-year review, MDEQ, July 16, 2007.

*Start of Cleanup Work Planned for September*, U.S. EPA fact sheet, August 2007.

E-mails re: polytank and soil disposal location, CRA, August 2, 2007.

Letter re: Five-year review, MDEQ, August 13, 2007.

Letter re: Deep aquifer and shallow aquifer in-situ chemical oxidation, U.S. EPA, August 21, 2007.

E-mail re: Dissolved methane in groundwater, MDEQ, August 21, 2007.

*Deep Aquifer In Situ Chemical Oxidation – Final Design*, CRA, August 24, 2007

*Shallow Aquifer In Situ Chemical Oxidation – Final Design*, CRA, August 24, 2007

E-mail re: Dissolved methane in groundwater, U.S. EPA, August 27, 2007.

Site Location

Superfund  
U.S. Environmental Protection Agency



Forest Waste Disposal  
Genesee County, MI

MID980410740



State



County



Site

Figure 1

Produced by Sarah Backhouse  
U.S. EPA Region 5 on 6/1/07  
Image Date: 2006





## 3D Surface Terrain Model

Superfund  
U.S. Environmental Protection AgencyForest Waste Disposal  
Genesee County, MI

MID980410740



## Elevation Feet

862 - 879
845 - 862
829 - 845
812 - 829
795 - 812
778 - 795
762 - 778
745 - 762
728 - 745

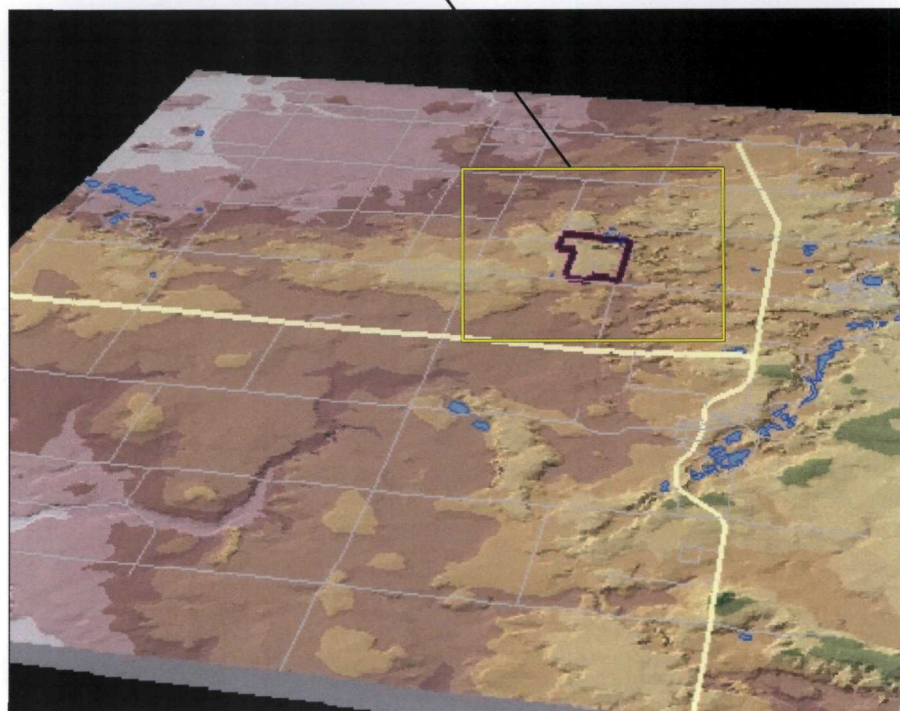


Figure 2

Produced by Sarah Backhouse  
U.S. EPA Region 5 on 6/4/07

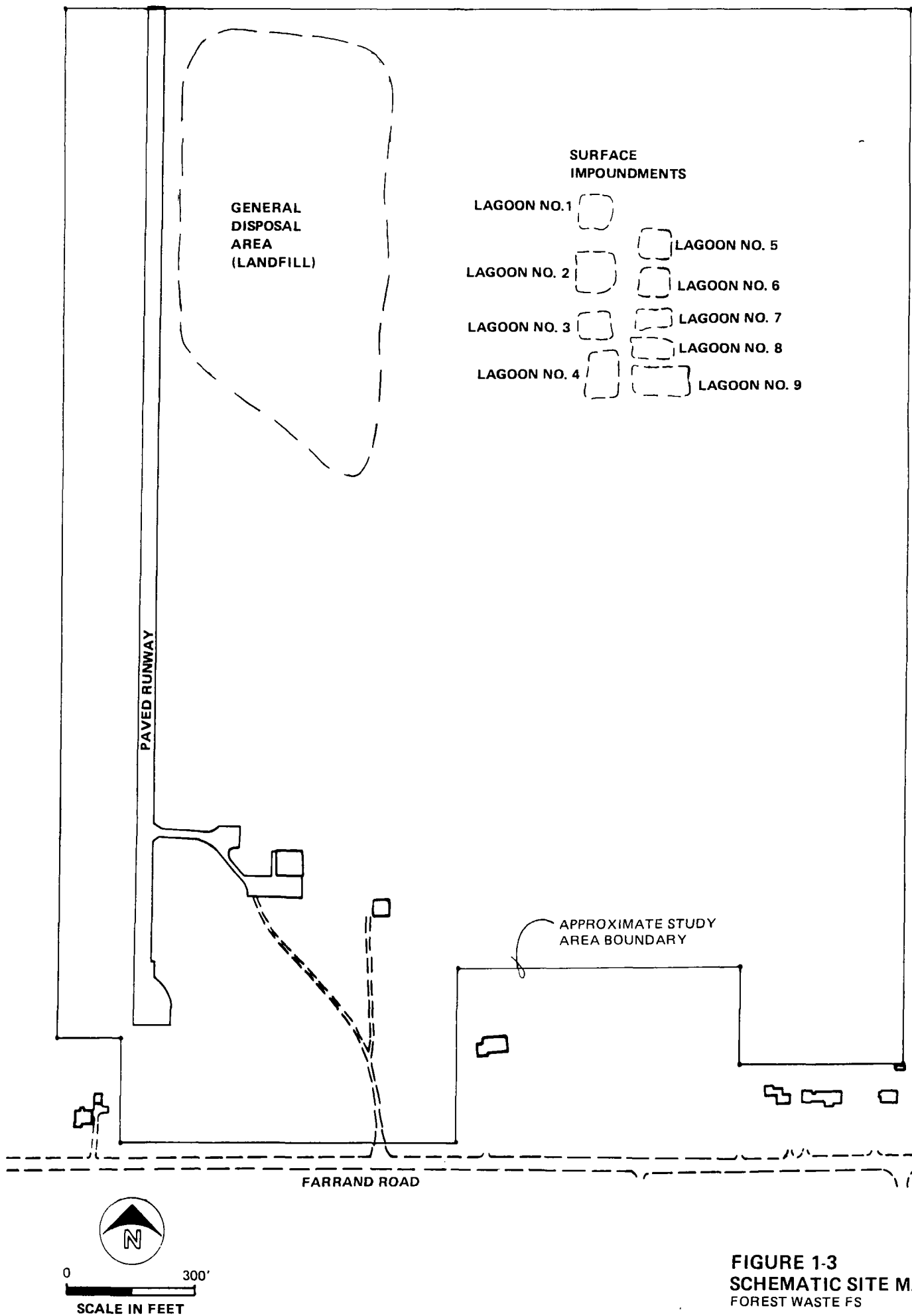
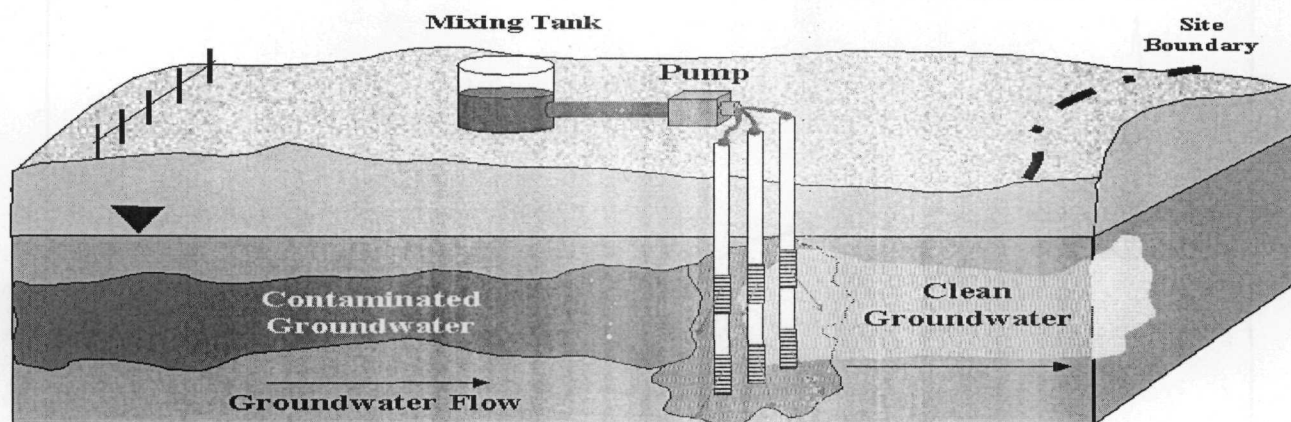


FIGURE 1-3  
SCHEMATIC SITE MAP  
FOREST WASTE FS







*The oxidation chemical, potassium permanganate, will be injected down semi-permanent wells or temporary borings at high pressure and forced out into the mass of contaminated underground water. The oxidant will then react with the vinyl chloride and cause it to break down into harmless substances.*

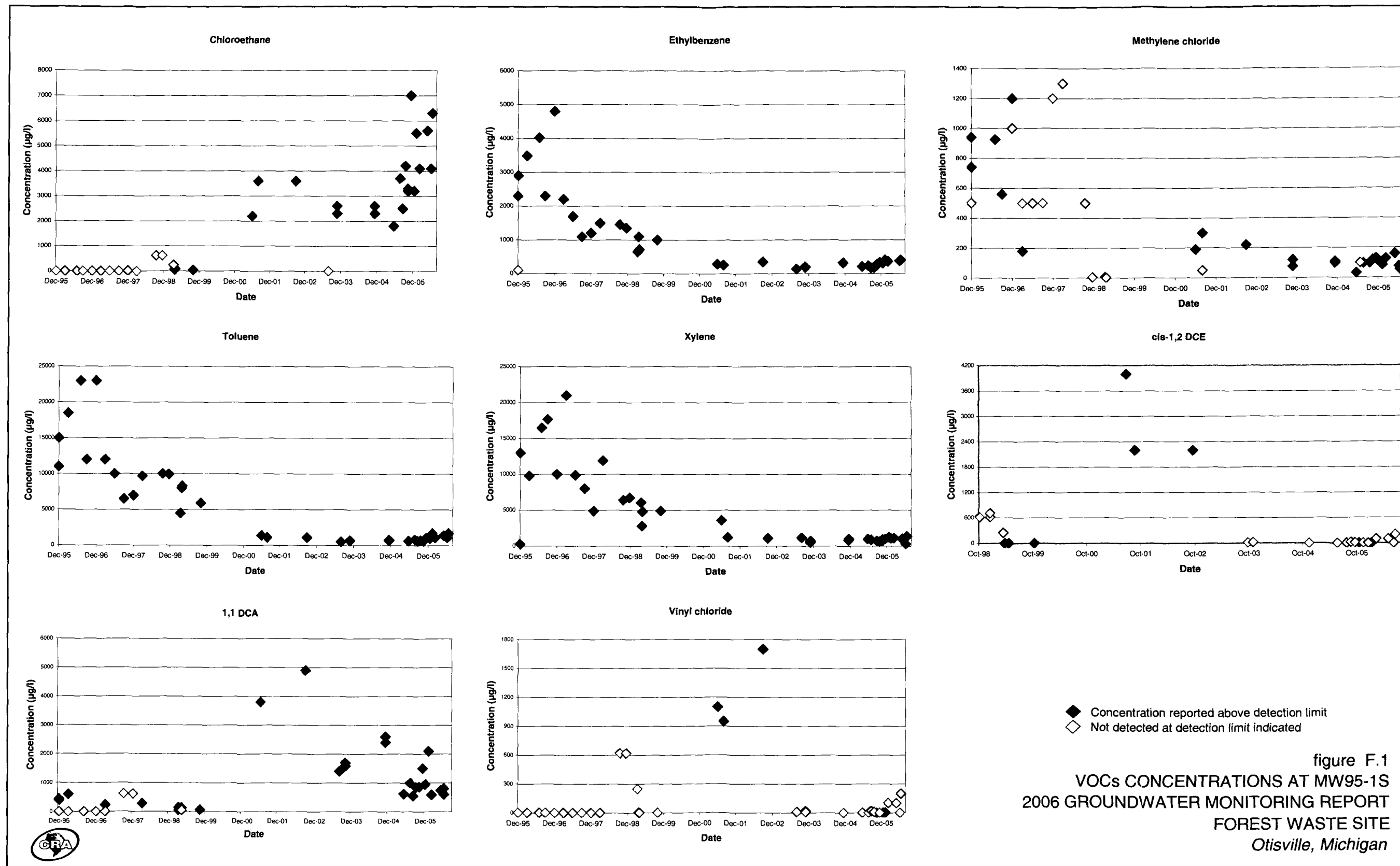
### Site history

The Forest Waste Disposal site located in Forest Township, Genesee County, Mich., originally covered 112 acres, but the area was expanded by an additional 80-acre parcel in September 2005. The disposal areas located on-site include an 11-acre landfill and nine former lagoons. General refuse and industrial and liquid waste were disposed of at the landfill and lagoons from 1973 to 1978, the year the state of Michigan revoked the landfill license due to various violations.

Human exposure to the hazardous waste stored on the site was eliminated by construction of a fence around the property to stop trespassers, complete removal of the lagoon waste in 1988-1989 and construction of a landfill cap in 1995-1997. The remaining potential health threat comes from the creeping masses of contaminated underground water, but the cleanup actions outlined in this fact sheet are designed to solve that problem.

All of the site property is under control of Forest Township. Deed notices at the location prohibit excavation and construction unless approved by EPA and also bar the use of ground water for anything except sampling. In 2005 EPA decided it was safe to use sections outside the landfill area for limited recreational activities. Forest Township through a permit system has allowed model airplane flying, archery and paintball in those areas.

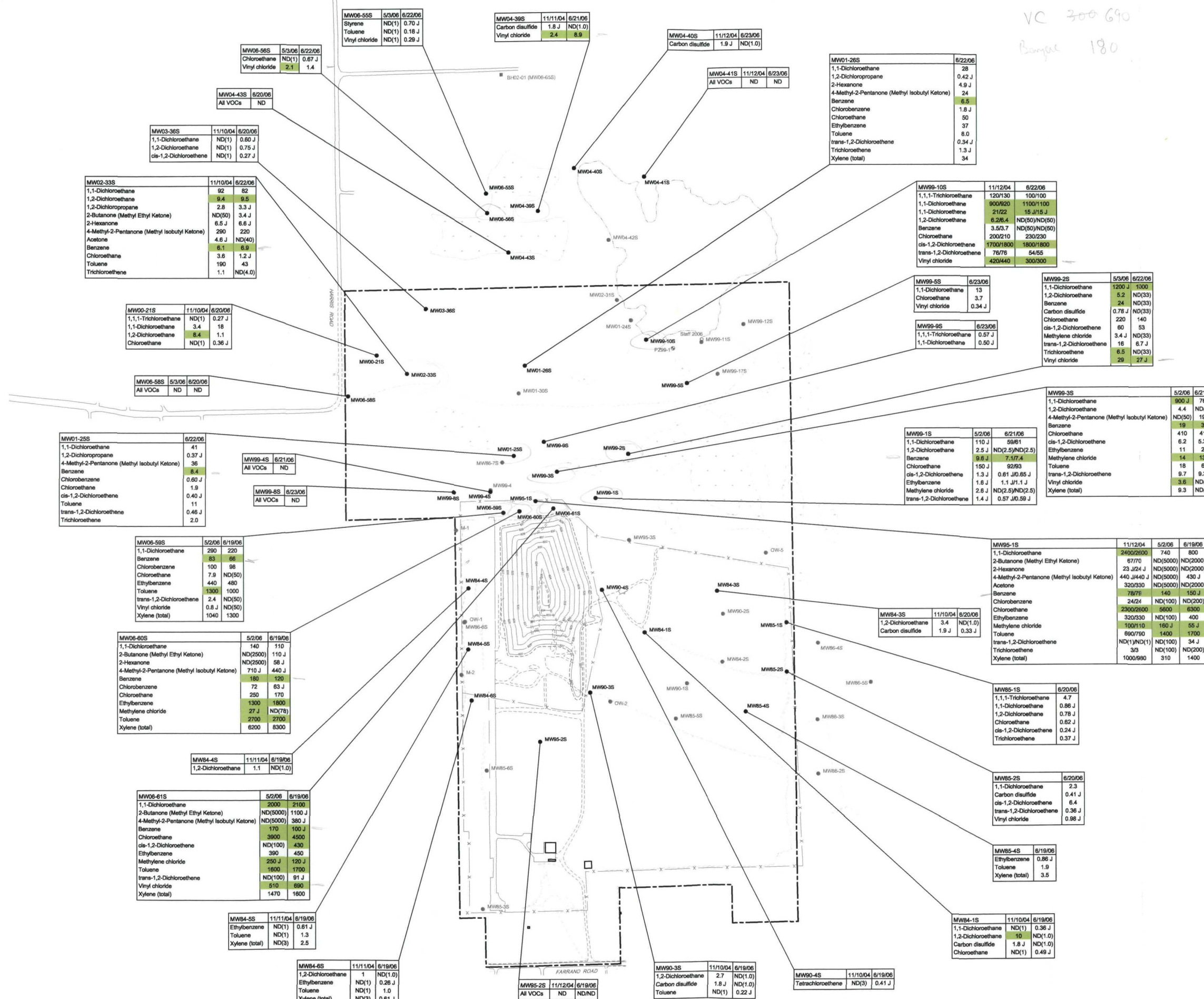
## Third Five-Year Review Report





# Third Five-Year Review Report

Attachment 6



0 100 300'

LEGEND

--- APPROXIMATE PROPERTY BOUNDARY

--- FENCE LINE

● MONITORING WELL LOCATION

○ SAMPLE LOCATION

○ SAMPLE DATE

○ SAMPLE RESULT (ug/L)

○ SAMPLE PARAMETER

EXCEEDANCE

J ESTIMATED RESULT

ND NOT DETECTED ABOVE DETECTION LIMITS

GROUNDWATER ACTION LEVEL	
Parameter	GWAL (ug/L)
1,1,1-TRICHLOROETHANE	200
1,1,1,2,2,2-HEPTACHLOROETHANE	8.6
1,1,2-TRICHLOROETHANE	5
1,1-DICHLOROETHANE	880
1,1-DICHLOROETHENE	7
1,2-DICHLOROETHANE	5
1,2-DICHLOROPROPANE	5
2-BUTANONE (METHYL ETHYL KETONE)	13000
2-HEXANONE	1000
4-METHYL-2-PENTANONE (METHYL ISOBUTYL KETONE)	1800
ACETONE	730
BENZENE	5
BROMODICHLOROMETHANE	80
BROMOFORM	80
BROMOMETHANE (METHYL BROMIDE)	10
CARBON DISULFIDE	800
CARBON TETRACHLORIDE	5
CHLOROETHANE	100
CHLOROETHANE	430
CHLOROFORM (TRICHLOROMETHANE)	80
CHLOROMETHANE (METHYL CHLORIDE)	260
CIS-1,2-DICHLOROETHENE	70
CIS-1,3-DICHLOROPROPENE	81
DIBROMOCHLOROMETHANE	700
ETHYL BENZENE	5
METHYLENE CHLORIDE	100
STYRENE	5
TETRACHLOROETHENE	1000
TRANS-1,2-DICHLOROETHENE	100
TRANS-1,3-DICHLOROPROPENE	5
TRICHLOROETHENE	2
VINYL CHLORIDE	10000
XYLENE (TOTAL)	

SCALE VERIFICATION

THIS BAR MEASURES 1" ON ORIGINAL. ADJUST SCALE ACCORDINGLY.

FOREST WASTE SITE  
OTISVILLE, MICHIGAN

SUMMARY OF DETECTED VOCs  
SHALLOW AQUIFER

CONESTOGA-ROVERS & ASSOCIATES

Source Reference:

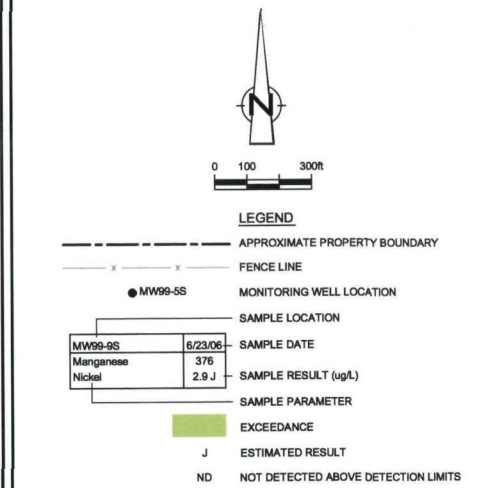
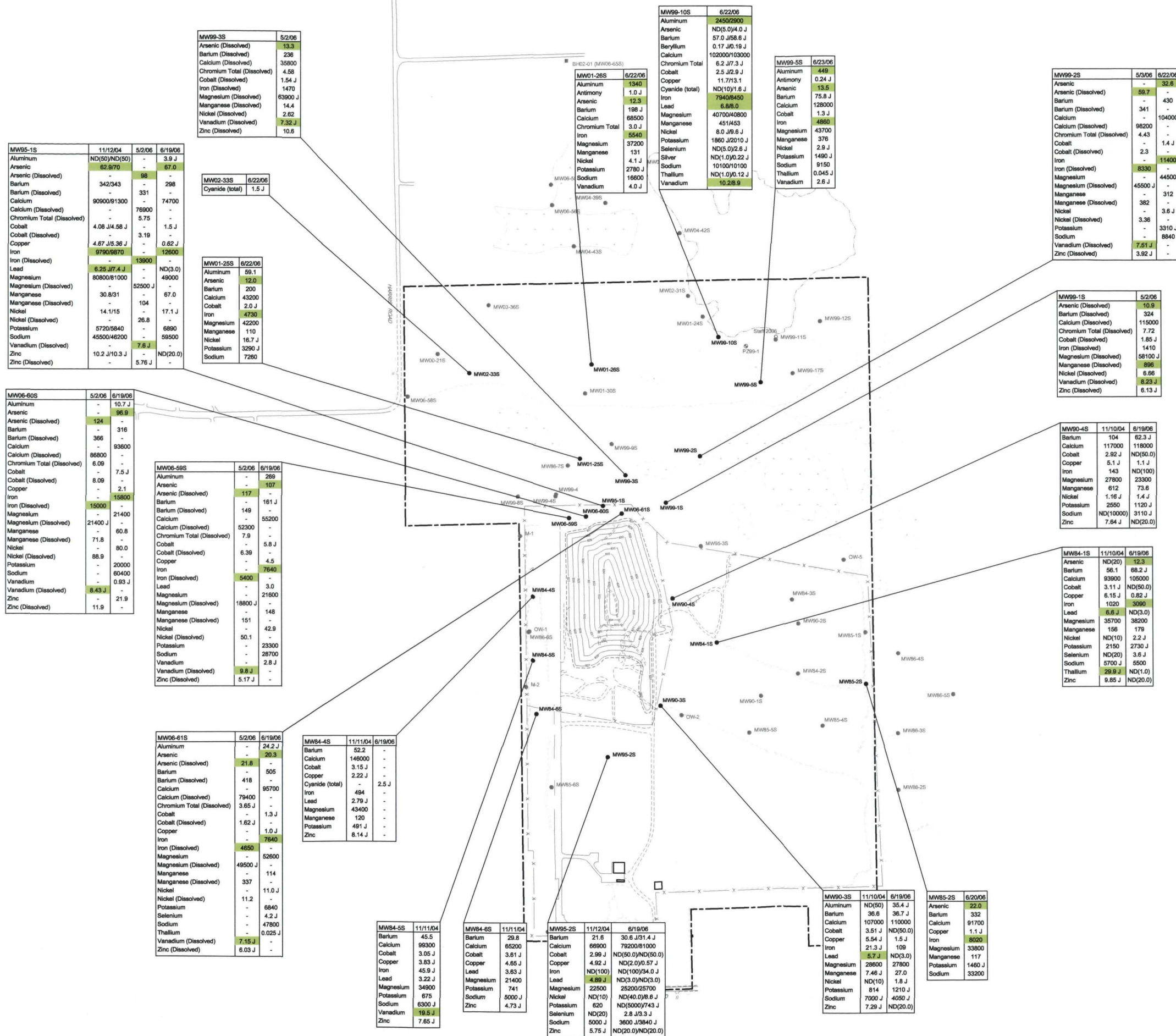
Project Manager: M. M. Reviewed By: J. V. Date: SEPTEMBER 2006

Scale: 1"=300' Project N#: 12210-50 Report N#: 025 Drawing N#: 4.1



# Third Five-Year Review Report

# Attachment 7



Parameter	GWAL (ug/L)
ALUMINUM	300
ANTIMONY	6
ARSENIC	10
BARIUM	2000
BERYLLIUM	4
CADMIUM	5
CALCIUM	-
CHROMIUM TOTAL	100
COBALT	40
COPPER	1400
IRON	2000
LEAD	4
MAGNESIUM	400000
MANGANESE	860
MERCURY	2
NICKEL	100
POTASSIUM	-
SELENIUM	50
SILVER	34
SODIUM	120000
THALLIUM	2
VANADIUM	4.5
ZINC	2400
CYANIDE (TOTAL)	200

**FOREST WASTE SITE  
OTISVILLE, MICHIGAN**

**SUMMARY OF DETECTED METALS AND CYANIDE  
SHALLOW AQUIFER**

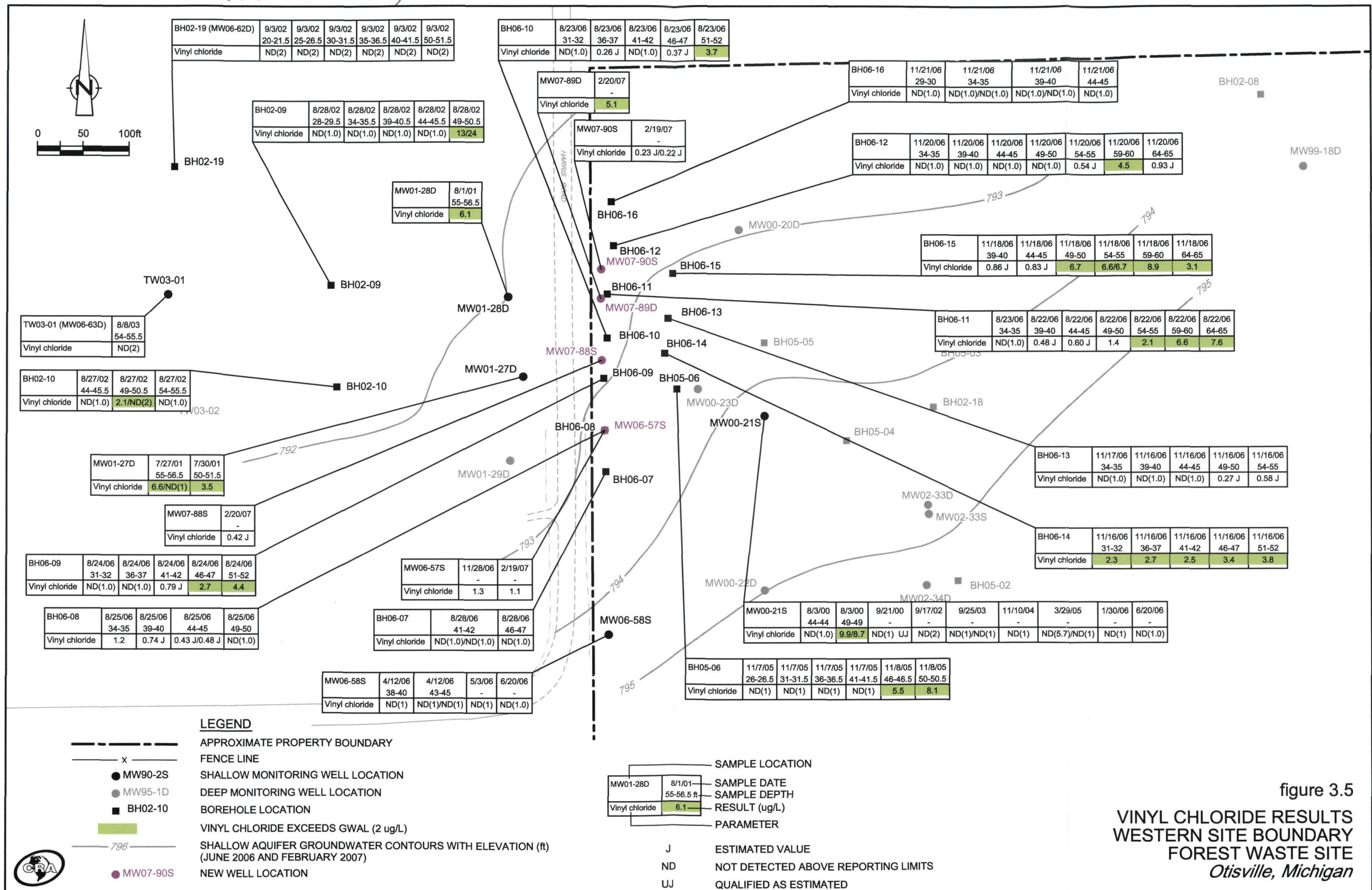
**CONESTOGA-ROVERS & ASSOCIATES**

Source Reference:

Project Manager:	Reviewed By:	Date:
M. M.	J. V.	SEPTEMBER 2006
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1"=300'	12210-50	025
		Drawing N°:
		4.5

12210-50(025)GN-WA017 SEP 01/2006







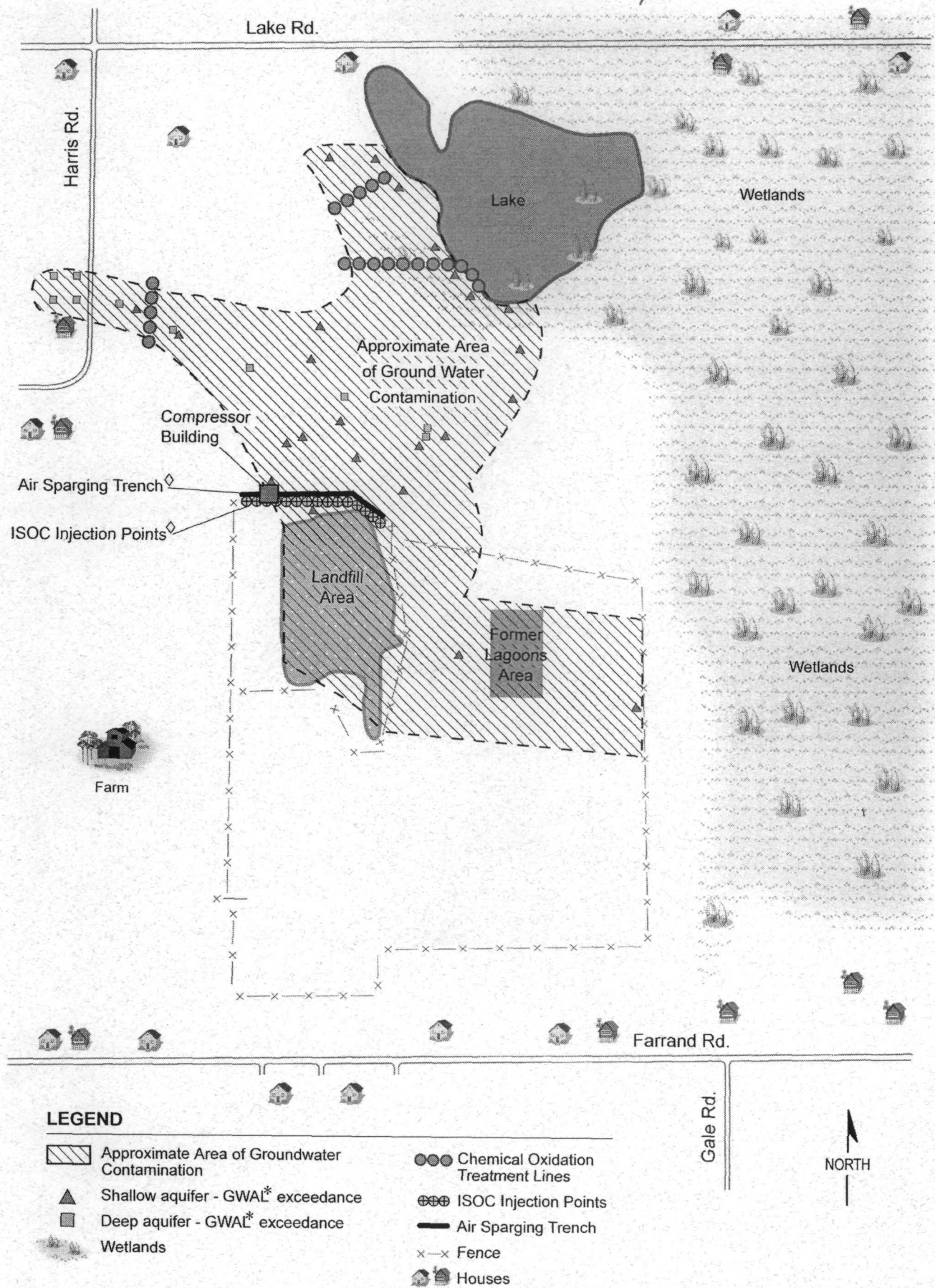


Figure 1. Forest Waste Disposal site source areas, ground water contamination and proposed ground water treatment locations.

residential well, the well will be closed and replaced with a well sunk into a deep aquifer (underground water-bearing rock formation). Cost estimates for 10 years and 30 years are included with each alternative. Here is a summary of the cleanup options:

**No Additional Action Alternative** – No action would be taken other than continued monitoring. EPA always includes a no action option as a comparison with other alternatives.

**Cost -- \$600,000**

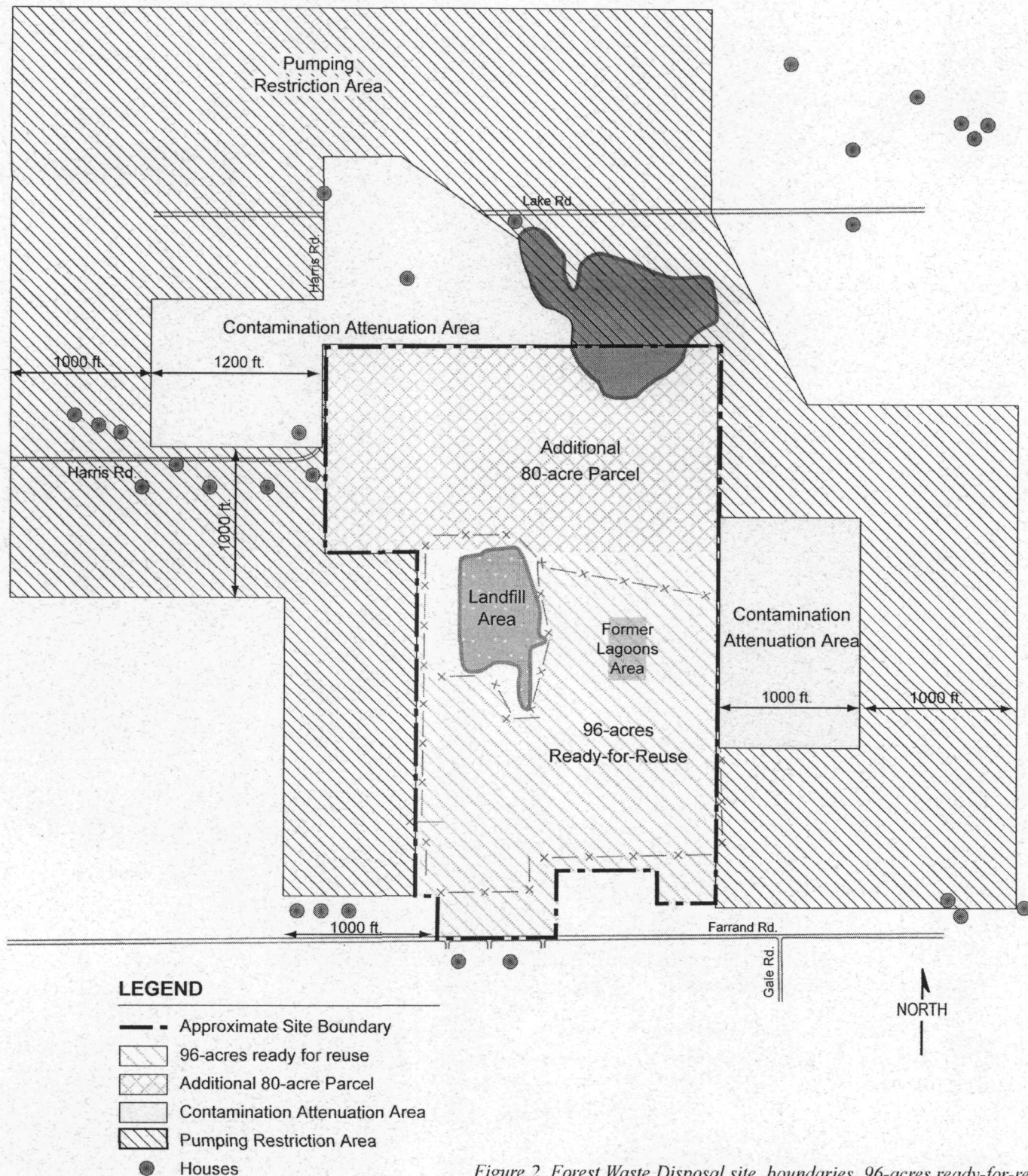


Figure 2. Forest Waste Disposal site, boundaries, 96-acres ready-for-reuse, additional 80-acre parcel, and well restriction areas.





**CONESTOGA-ROVERS  
& ASSOCIATES**

651 Colby Drive, Waterloo, Ontario, Canada N2V 1C2  
Telephone: 519-884-0510 Facsimile: 519-884-0525  
www.CRAworld.com

June 26, 2007

Reference No. 012210

Mr. Richard Boice  
Remedial Project Manager  
United States Environmental Protection Agency  
Region V  
77 West Jackson Street  
Chicago, Illinois

Dear Mr. Boice:

Re: Investigative Derived Waste Analytical Results - Five-Year Review (2002-2007)  
Forest Waste Site - Otisville, Michigan

Conestoga-Rovers & Associates (CRA) has prepared the following letter on behalf of the Forest Waste Coordinating Committee (FWCC) to present the analytical results for the investigative derived waste (IDW) generated at the Forest Waste Site (Site) in Otisville, Michigan from March 2002 to March 2007. The purpose of submitting these results is to confirm that the IDW generated at the Site was not hazardous and did not require off-Site disposal.

From March 2002 to March 2007 waste was generated at the Site from drilling, decontamination, development and sampling activities. During drilling activities, the generated soil cuttings were containerized and placed in plastic lined roll-off boxes or drums on Site. The roll-off boxes were covered with watertight tarps or plastic to prevent rainwater from collecting in the roll-off boxes. Soil samples were collected from the roll-off boxes and drums and analyzed using the Toxicity Characteristic Leaching Procedure (TCLP) for volatile organic compounds (VOCs) and metals. The analytical results presented in Table 1 were compared to the TCLP Regulatory Levels provided in Figure III-7 of the Resource Conservation and Recovery Act (RCRA) Orientation Manual developed by the United States Environmental Protection Agency (USEPA). All soil samples collected from the roll-off boxes and drums were determined to be non-hazardous and the soil in the roll-off boxes and drums were disposed of on-Site by spreading the soil in an area south of the landfill.

Water generated from decontamination, development and sampling activities was stored in aboveground storage tanks (polytanks) on-Site with secondary containment. There are two polytanks on Site, one is located south of the landfill inside the fenced landfill area and the second is located north of the landfill inside the fenced iSOC® pilot-scale test area. Water samples were collected from the polytanks following each phase of investigation and were analyzed using TCLP for VOCs. The analytical results presented in Table 2 were compared to the TCLP Regulatory Levels. All water samples collected from the polytanks were determined



**CONESTOGA-ROVERS  
& ASSOCIATES**

June 26, 2007

2

Reference No. 012210

to be non-hazardous and the water in the polytanks was disposed of on-Site adjacent to each polytank.

Future IDW analytical results will be submitted to the USEPA and the Michigan Department of Environmental Quality (MDEQ) with the Monthly Progress Reports as required under the Consent Decree. If future IDW is determined to be hazardous and requires off-Site disposal, copies of the waste manifests will also be provided.

Should you have any questions on the above, please do not hesitate to contact us.

Yours truly,

CONESTOGA-ROVERS & ASSOCIATES

Michael G. Mateyk, P.Geo.

NS/as/236

Encl.

c.c.: Luanne Vanderpool, USEPA (1 copy)  
Deborah Larsen, MDEQ (2 copies)  
Steve Nadeau (1 copy)  
FWCC (PDF)

TABLE 1

**ANALYTICAL RESULTS SUMMARY  
INVESTIGATIVE DERIVED WASTE - SOIL  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN  
MARCH 2002 - MARCH 2007**

<i>Sample Location:</i>			<i>North Rolloff</i>	<i>South Rolloff</i>	<i>ROLL-OFF</i>	<i>ROLL-OFF</i>
<i>Sample ID:</i>			<i>S-12210-060503-BW-068</i>	<i>S-12210-060503-BW-069</i>	<i>S-12210-032204-BW-089</i>	<i>S-12210-100904-BW-018</i>
<i>Sample Date:</i>			<i>6/5/2003</i>	<i>6/5/2003</i>	<i>3/22/2004</i>	<i>10/9/2004</i>
<i>Parameters</i>	<i>Units</i>	TCLP Regulatory Levels				
<i>Volatile Organic Compounds-TCLP</i>						
1,1-Dichloroethene	mg/L	0.7	ND (0.7)	ND (0.7)	ND (0.05)	ND (0.05)
1,2-Dichloroethane	mg/L	0.5	ND (0.5)	ND (0.5)	ND (0.05)	ND (0.05)
2-Butanone (Methyl Ethyl Ketone)	mg/L	200	ND (200)	ND (200)	ND (0.1)	ND (0.1)
Benzene	mg/L	0.5	ND (0.5)	ND (0.5)	ND (0.05)	ND (0.05)
Carbon tetrachloride	mg/L	0.5	ND (0.5)	ND (0.5)	ND (0.05)	ND (0.05)
Chlorobenzene	mg/L	100	ND (100)	ND (100)	ND (0.05)	ND (0.05)
Chloroform (Trichloromethane)	mg/L	6	ND (6)	ND (6)	ND (0.05)	ND (0.05)
Tetrachloroethene	mg/L	0.7	ND (0.7)	ND (0.7)	ND (0.05)	ND (0.05)
Trichloroethene	mg/L	0.5	ND (0.5)	ND (0.5)	ND (0.05)	ND (0.05)
Vinyl chloride	mg/L	0.2	ND (0.2)	ND (0.2)	ND (0.1)	ND (0.1)
<i>Metals-TCLP</i>						
Arsenic	mg/L	5	ND (5)	ND (5)	ND (0.2)	ND (0.25)
Barium	mg/L	100	ND (100)	ND (100)	1.19	0.639
Cadmium	mg/L	1	ND (1)	ND (1)	ND (0.1)	ND (0.25)
Chromium Total	mg/L	5	ND (5)	ND (5)	ND (0.1)	ND (0.25)
Lead	mg/L	5	ND (5)	ND (5)	ND (0.2)	ND (0.25)
Mercury	mg/L	0.2	ND(0.2)	ND(0.2)	--	--
Selenium	mg/L	1	ND (1)	ND (1)	ND (0.2)	ND (0.25)
Silver	mg/L	5	ND (5)	ND (5)	ND (0.1)	ND (0.25)

## Notes:

ND: Not detected above the reporting limit

}: Estimated value

U: Qualified as not detected

TABLE 1

**ANALYTICAL RESULTS SUMMARY  
INVESTIGATIVE DERIVED WASTE - SOIL  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN  
MARCH 2002 - MARCH 2007**

<i>Sample Location:</i>			<i>ROLL-OFF</i>	<i>Soil-RollOff</i>	<i>DrumComposite-5C</i>	<i>DrumComposite-7A</i>	<i>DrumComposite-7B</i>
<i>Sample ID:</i>			GW-12210-061705-JY-025	GW-12210-010606-BW-202	S-12210-090806-JY-121	S-12210-090806-JY-118	S-12210-090806-JY-119
<i>Sample Date:</i>			6/17/2005	1/6/2006	9/8/2006	9/8/2006	9/8/2006
<i>Parameters</i>	<i>Units</i>	TCLP Regulatory Levels					
<i>Volatile Organic Compounds-TCLP</i>							
1,1-Dichloroethene	mg/L	0.7	--	ND (0.05)	ND (0.070)U	ND (0.070)U	ND (0.070)U
1,2-Dichloroethane	mg/L	0.5	--	ND (0.05)	ND (0.025)U	ND (0.025)U	ND (0.025)U
2-Butanone (Methyl Ethyl Ketone)	mg/L	200	--	ND (0.1)	ND (0.050)U	ND (0.050)U	ND (0.050)U
Benzene	mg/L	0.5	--	ND (0.05)	ND (0.025)U	ND (0.025)U	ND (0.025)U
Carbon tetrachloride	mg/L	0.5	--	ND (0.05)	ND (0.025)U	ND (0.025)U	ND (0.025)U
Chlorobenzene	mg/L	100	--	ND (0.05)	ND (0.025)U	ND (0.025)U	ND (0.025)U
Chloroform (Trichloromethane)	mg/L	6	--	ND (0.05)	ND (0.025)U	ND (0.025)U	ND (0.025)U
Tetrachloroethene	mg/L	0.7	--	ND (0.05)	ND (0.070)U	ND (0.070)U	ND (0.070)U
Trichloroethene	mg/L	0.5	--	ND (0.05)	ND (0.050)U	ND (0.050)U	ND (0.050)U
Vinyl chloride	mg/L	0.2	--	ND (0.1)	ND (0.025)U	ND (0.025)U	ND (0.025)U
<i>Metals-TCLP</i>							
Arsenic	mg/L	5	ND (0.2)	ND (0.2)	ND (0.50)U	ND (0.50)U	ND (0.50)U
Barium	mg/L	100	ND (1)	0.56	ND (10.0)U	ND (10.0)U	ND (10.0)U
Cadmium	mg/L	1	ND (0.01)	0.0029 J	ND (0.10)U	ND (0.10)U	ND (0.10)U
Chromium Total	mg/L	5	ND (0.02)	ND (0.1)U	ND (0.50)U	ND (0.50)U	ND (0.50)U
Lead	mg/L	5	1.21	ND (0.1)	ND (0.50)U	ND (0.50)U	ND (0.50)U
Mercury	mg/L	0.2	ND (0.0002)	--	ND (0.0020)U	ND (0.0020)U	ND (0.0020)U
Selenium	mg/L	1	ND (0.2)	ND (0.2)	ND (0.25)U	ND (0.25)U	ND (0.25)U
Silver	mg/L	5	ND (0.02)	ND (0.1)	ND (0.50)U	ND (0.50)U	ND (0.50)U

## Notes:

ND: Not detected above the reporting limit

J: Estimated value

U: Qualified as not detected

TABLE 1

**ANALYTICAL RESULTS SUMMARY  
INVESTIGATIVE DERIVED WASTE - SOIL  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN  
MARCH 2002 - MARCH 2007**

<i>Sample Location:</i>			<i>DrumComposite-7C</i>	<i>DrumCIW06-3A</i>	<i>Soil-Drum</i>	<i>Soil-Drum</i>
<i>Sample ID:</i>			<i>S-12210-090806-JY-120</i>	<i>S-12210-091306-BW-122</i>	<i>SO-12210-120406-BW-281</i>	<i>S-12210-022307-BW-289</i>
<i>Sample Date:</i>			<i>9/8/2006</i>	<i>9/13/2006</i>	<i>12/4/2006</i>	<i>2/23/2007</i>
<i>Parameters</i>	<i>Units</i>	TCLP Regulatory Levels				
<b><i>Volatile Organic Compounds-TCLP</i></b>						
1,1-Dichloroethene	mg/L	0.7	ND (0.070)U	ND (0.070)U	ND (0.070)	ND (0.070)
1,2-Dichloroethane	mg/L	0.5	ND (0.025)U	ND (0.025)U	ND (0.025)	ND (0.025)
2-Butanone (Methyl Ethyl Ketone)	mg/L	200	ND (0.050)U	ND (0.25)U	ND (0.25)	ND (0.25)
Benzene	mg/L	0.5	ND (0.025)U	ND (0.025)U	0.031	ND (0.025)
Carbon tetrachloride	mg/L	0.5	ND (0.025)U	ND (0.025)U	ND (0.025)	ND (0.025)
Chlorobenzene	mg/L	100	ND (0.025)U	ND (0.025)U	ND (0.025)	ND (0.025)
Chloroform (Trichloromethane)	mg/L	6	ND (0.025)U	ND (0.025)U	ND (0.025)	ND (0.025)
Tetrachloroethene	mg/L	0.7	ND (0.070)U	ND (0.070)U	ND (0.070)	ND (0.070)
Trichloroethene	mg/L	0.5	ND (0.050)U	ND (0.050)U	ND (0.050)	ND (0.050)
Vinyl chloride	mg/L	0.2	ND (0.025)U	ND (0.025)U	ND (0.025)	ND (0.025)
<b><i>Metals-TCLP</i></b>						
Arsenic	mg/L	5	ND (0.50)U	ND (0.50)U	ND (0.50)	ND (0.50)
Barium	mg/L	100	ND (10.0)U	0.23 B	ND (10.0)	ND (10.0)
Cadmium	mg/L	1	ND (0.10)U	0.0011 B	ND (0.10)	ND (0.10)
Chromium Total	mg/L	5	ND (0.50)U	ND (0.50)U	ND (0.50)	ND (0.50)
Lead	mg/L	5	ND (0.50)U	ND (0.50)U	ND (0.50)	ND (0.50)
Mercury	mg/L	0.2	ND (0.0020)U	0.00011 B	ND (0.0020)	ND (0.0020)
Selenium	mg/L	1	ND (0.25)U	ND (0.25)U	ND (0.25)	ND (0.25)
Silver	mg/L	5	ND (0.50)U	ND (0.50)U	ND (0.50)	ND (0.50)

## Notes:

ND: Not detected above the reporting limit

J: Estimated value

U: Qualified as not detected

TABLE 2

**ANALYTICAL RESULTS SUMMARY  
INVESTIGATIVE DERIVED WASTE - WATER  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN  
MARCH 2002 - MARCH 2007**

<b>Sample Location:</b>			<b>Polytank</b>	<b>Polytank</b>	<b>Polytank</b>	<b>Polytank</b>
<b>Sample ID:</b>			<b>GW-12210-090602-BW-177</b>	<b>GW-12210-053003-BW-070</b>	<b>GW-12210-111003-BW-161</b>	<b>GW-12210-111003-BW-162</b>
<b>Sample Date:</b>			<b>9/6/2002</b>	<b>5/30/2003</b>	<b>11/10/2003</b>	<b>11/10/2003</b>
<b>Parameters</b>	<b>Units</b>	<b>TCLP Regulatory Levels</b>				
<b>Volatile Organic Compounds-TCLP</b>						
1,1-Dichloroethene	mg/L	0.7	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
1,2-Dichloroethane	mg/L	0.5	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
2-Butanone (Methyl Ethyl Ketone)	mg/L	200	ND (0.01)	ND (0.050)	ND (0.050)	ND (0.1)
Benzene	mg/L	0.5	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Carbon tetrachloride	mg/L	0.5	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Chlorobenzene	mg/L	100	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Chloroform (Trichloromethane)	mg/L	6	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Tetrachloroethene	mg/L	0.7	ND (0.003)	ND (0.003)	ND (0.003)	ND (0.05)
Trichloroethene	mg/L	0.5	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Vinyl chloride	mg/L	0.2	ND (0.002)	ND (0.002)	ND (0.001)	ND (0.1)

## Notes:

ND: Not detected above the reporting limit

J: Estimated value

U: Qualified as not detected

TABLE 2

**ANALYTICAL RESULTS SUMMARY  
INVESTIGATIVE DERIVED WASTE - WATER  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN  
MARCH 2002 - MARCH 2007**

<i>Sample Location:</i>			<i>Polytank</i>	<i>POLY-1</i>	<i>POLY-2</i>	<i>TANK1</i>
<i>Sample ID:</i>			GW-12210-111204-BW-051	GW-12210-061705-JY-023	GW-12210-061705-JY-024	GW-12210-010606-BW-199
<i>Sample Date:</i>			11/12/2004	6/17/2005	6/17/2005	1/6/2006
<i>Parameters</i>	<i>Units</i>	TCLP Regulatory Levels				
<i>Volatile Organic Compounds-TCLP</i>						
1,1-Dichloroethene	mg/L	0.7	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
1,2-Dichloroethane	mg/L	0.5	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
2-Butanone (Methyl Ethyl Ketone)	mg/L	200	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.1)
Benzene	mg/L	0.5	ND (0.001)	0.1	ND (0.001)	ND (0.05)
Carbon tetrachloride	mg/L	0.5	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Chlorobenzene	mg/L	100	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Chloroform (Trichloromethane)	mg/L	6	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Tetrachloroethene	mg/L	0.7	ND (0.003)	ND (0.001)	ND (0.001)	ND (0.05)
Trichloroethene	mg/L	0.5	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.05)
Vinyl chloride	mg/L	0.2	ND (0.001)	ND (0.001)	ND (0.001)	ND (0.1)

## Notes:

ND: Not detected above the reporting limit

J: Estimated value

U: Qualified as not detected

TABLE 2

**ANALYTICAL RESULTS SUMMARY  
INVESTIGATIVE DERIVED WASTE - WATER  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN  
MARCH 2002 - MARCH 2007**

<b>Sample Location:</b>			<b>TANK2</b>	<b>TANK3</b>	<b>PolyTank4</b>	<b>POLY-1</b>
<b>Sample ID:</b>			<b>GW-12210-010606-BW-200</b>	<b>GW-12210-010606-BW-201</b>	<b>GW-12210-011606-BW-236</b>	<b>GW-12210-062306-BW-072</b>
<b>Sample Date:</b>			<b>1/6/2006</b>	<b>1/6/2006</b>	<b>1/16/2006</b>	<b>6/23/2006</b>
<b>Parameters</b>	<b>Units</b>	<b>TCLP Regulatory Levels</b>				
<b>Volatile Organic Compounds-TCLP</b>						
1,1-Dichloroethene	mg/L	0.7	ND (0.05)	ND (0.05)	ND (0.001)	ND (0.001)
1,2-Dichloroethane	mg/L	0.5	ND (0.05)	ND (0.05)	ND (0.001)	ND (0.001)
2-Butanone (Methyl Ethyl Ketone)	mg/L	200	ND (0.1)	ND (0.1)	ND (0.05)	ND (0.01)
Benzene	mg/L	0.5	ND (0.05)	ND (0.05)	ND (0.001)	ND (0.001)
Carbon tetrachloride	mg/L	0.5	ND (0.05)	ND (0.05)	ND (0.001)	ND (0.001)
Chlorobenzene	mg/L	100	ND (0.05)	ND (0.05)	ND (0.001)	ND (0.001)
Chloroform (Trichloromethane)	mg/L	6	ND (0.05)	ND (0.05)	ND (0.001)	ND (0.001)
Tetrachloroethene	mg/L	0.7	ND (0.05)	ND (0.05)	ND (0.001)	ND (0.001)
Trichloroethene	mg/L	0.5	ND (0.05)	ND (0.05)	ND (0.001)	ND (0.001)
Vinyl chloride	mg/L	0.2	ND (0.1)	ND (0.1)	ND (0.001)	ND (0.001)

## Notes:

ND: Not detected above the reporting limit

J: Estimated value

U: Qualified as not detected



TABLE 2

**ANALYTICAL RESULTS SUMMARY  
INVESTIGATIVE DERIVED WASTE - WATER  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN  
MARCH 2002 - MARCH 2007**

*Sample Location:**Sample ID:**Sample Date:**PolyTank4**WG-12210-120406-BW-281**12/4/2006**PolyTank4**GW-12210-022007-BW-289**2/20/2007*

<i>Parameters</i>	<i>Units</i>	TCLP Regulatory Levels
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*Volatile Organic Compounds-TCLP*

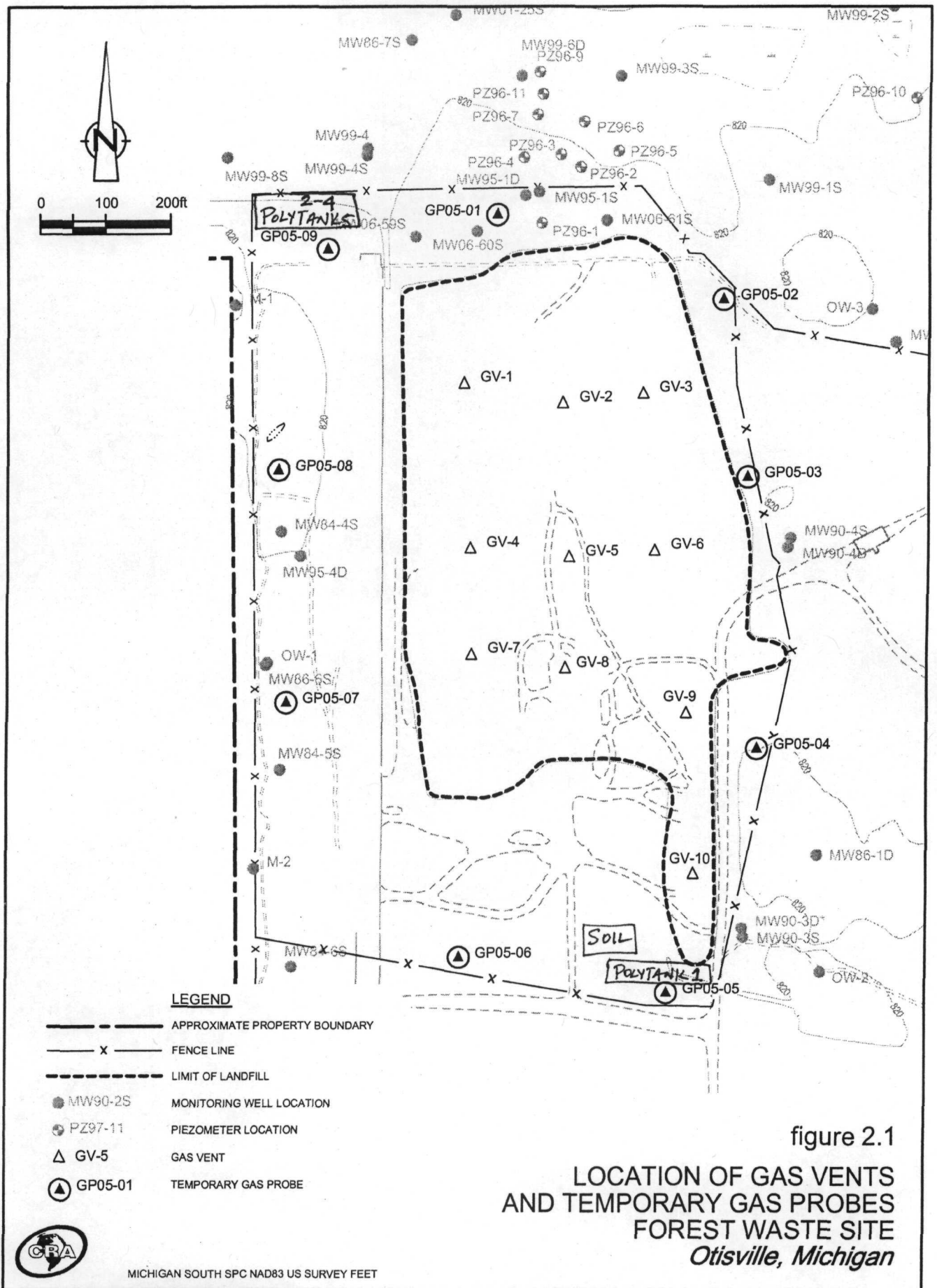
1,1-Dichloroethene	mg/L	0.7	ND (0.05)	ND (0.001)
1,2-Dichloroethane	mg/L	0.5	ND (0.05)	ND (0.001)
2-Butanone (Methyl Ethyl Ketone)	mg/L	200	0.027	0.0021 J
Benzene	mg/L	0.5	ND (0.05)	ND (0.001)
Carbon tetrachloride	mg/L	0.5	ND (0.05)	ND (0.001)
Chlorobenzene	mg/L	100	ND (0.05)	ND (0.001)
Chloroform (Trichloromethane)	mg/L	6	ND (0.05)	ND (0.001)
Tetrachloroethene	mg/L	0.7	ND (0.05)	ND (0.001)
Trichloroethene	mg/L	0.5	ND (0.05)	ND (0.001)
Vinyl chloride	mg/L	0.2	ND (0.05)	ND (0.001)

Notes:

ND: Not detected above the reporting limit

J: Estimated value

U: Qualified as not detected



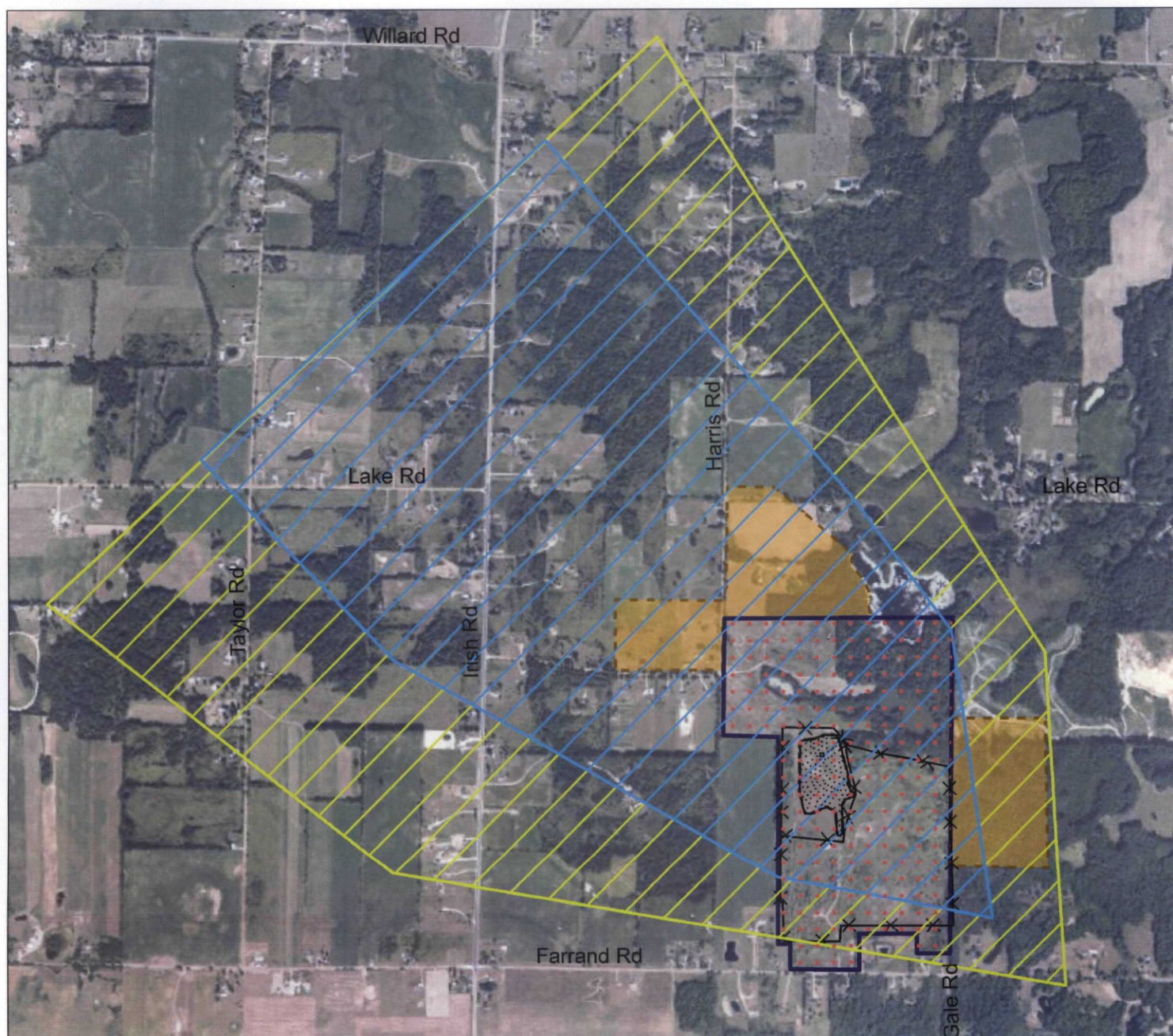


## Institutional Control (IC) Review

Areas Depicting Required and Implemented Institutional Controls

Superfund  
U.S. Environmental Protection AgencyForest Waste Disposal  
Genesee County, MI

MID980410740



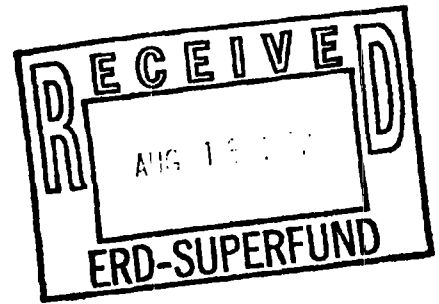
## Legend\*

- Forest Waste Disposal Boundary
- Fence
- Landfill Area
- Contamination Attenuation Area - Required IC
- Pumping Restriction Area with Well at 10 GPM - Required IC
- Pumping Restriction Area with Well at 50 GPM - Required IC
- Declaration of Restrictive Covenant (2002) - Implemented IC

0 1,000 2,000  
FeetCreated by Sarah Backhouse  
U.S. EPA Region 5 on 11/28/06  
Image Date: 08/03

EPA Disclaimer: Please be advised that areas depicted in the map have been estimated. The map does not create any rights enforceable by any party. EPA may refine or change this data and map at any time.

\*See Attachment 1 for Summary of Institutional Controls



Instr: 200207170002228 07/17/2007  
P: 1 of 7 F: \$21.00 3:06PM  
Melvin Phillip McCree T20020024786  
Genesee County Register PL

### DECLARATION OF RESTRICTIVE COVENANT

MDEQ Reference No.: RC-ERD-02-014

This Restrictive Covenant has been recorded with the Genesee County Register of Deeds for the purpose of protecting public health, safety and welfare and the environment.

Forest Township is the owner of an approximate 190 acre parcel located in Forest Township, Genesee County, State of Michigan (the "Property"), more particularly described in the legal description attached as Exhibit "A." The property tax identification numbers are: 09-08-200-0001 and 09-08-400-012.

The Property is the subject of an approved remedial action (the "Remedial Action") which is set forth in the Scope of Work (the "SOW") incorporated by reference into a Consent Decree entered in the United States District Court for the Eastern District of Michigan on February 14, 1995, for *United States of America vs. Agrico Chemical Co. Inc., et al*, Civil Action No. 94-40462 (the "Consent Decree") pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C. § 9601 et seq. ("CERCLA") and Part 201 of Michigan's Natural Resources and Environmental Protection Act ("NREPA"), MCL 324.20101 et seq.

As used in this Covenant, the term "Owner" shall mean at any given time the then current title holder of the Property.

The Defendants listed in the Consent Decree are the members of the Forest Waste Coordinating Committee (the "FWCC") who agreed to perform the requirements of the SOW.

Within the Property is the area of the remediated Landfill, which is surrounded by a fence, shown on the figure attached as Exhibit "B" (the "Landfill Area").

Phyllis Nelson  
130 main St, Otseville, mi 48463

1/1

NOW, THEREFORE, pursuant to CERCLA, NREPA, and the Consent Decree, the Owner hereby imposes the following restrictions on the Property and covenants and agrees that:

1. The Owner shall restrict activities on the Property that may interfere with the Remedial Action including operation and maintenance, monitoring, or other measures necessary to assure the effectiveness and integrity of the Remedial Action.

2. The Owner shall restrict the uses of the Property to those that are consistent with the cleanup criteria established pursuant to the SOW. The cleanup criteria for the Property are set forth in the SOW, a copy of which is on file with the Clerk of the U.S. District Court for the Eastern District of Michigan (CA# 94-40462) as an exhibit to the Consent Decree.

3. The Owner shall restrict activities on the Property that may result in exposures above those levels established in the SOW, as follows:

- a. There shall be no use of groundwater on the Property other than for response or monitoring activities without the advance written approval of U.S. EPA and MDEQ;
- b. There shall be a permanent prohibition against any mining, excavating, regrading or disturbing of soils within the Landfill Area except for maintenance of the site roads or other activities associated with the remediation;
- c. There shall be no construction, installation or use of any buildings, pipes, roads, ditches or any other structure on the Property unless such construction, installation or use is approved in advance, in writing, by U.S. EPA and MDEQ, following notice to the FWCC;
- d. There shall be a permanent prohibition against any disturbance, disruption or interference with any aspect of the Remedial Action, including without limitation its groundwater monitoring wells, fencing, groundwater extraction equipment (if needed) or any other elements of the Remedial Action;
- e. Owner shall not permit any soil or other environmental media to be removed from the Landfill Area;



- f. Owner shall not permit soil or groundwater to be removed from the rest of the Property outside of the Landfill Area except trace amounts to be tested to determine if such media can be used without posing a threat to the public health, safety, welfare or environment, except with the prior written knowledge of U.S. EPA and MDEQ, following notice to the FWCC;
- g. Owner shall restrict all access to the Landfill Area, except as is necessary for U.S. EPA, MDEQ or the FWCC and those entities' designated representatives to inspect, monitor or maintain the Landfill Area as required under the Consent Decree.

4. The Owner shall provide notice to the U.S. EPA, MDEQ and the FWCC of the Owner's intent to convey any interest in the Property or a portion thereof at least 60 days prior to consummating the conveyance. A conveyance of title, and easement or any other interest in the Property shall not be consummated by the Owner without adequate and complete provision for compliance with the terms and conditions of this Restrictive Covenant. For purposes of this Restrictive Covenant, adequate and complete provision for compliance with the terms and conditions of this Restrictive Covenant means that the Owner shall provide an affidavit setting forth that the prohibitions and requirements contained in this Restrictive Covenant have been met, and that written approval of the proposed transfer has been obtained from U.S. EPA and MDEQ, following notice to the FWCC.

5. The Owner shall grant to U.S. EPA, MDEQ, the FWCC and each entities' designated representatives the right to enter the Property at reasonable times for the purpose of determining and monitoring compliance with the Consent Decree, including the right to take samples, inspect the operation of the Remedial Action measures, and inspect records.

6. Owner acknowledges and agrees that U.S. EPA, the State of Michigan, and the FWCC may enforce the restrictions set forth in this Restrictive Covenant by legal action, including an injunction, in a court of appropriate jurisdiction;

7. The FWCC shall be provided the right of first refusal on any transfer of any interest in the Property or of any portion thereof.

8. The restrictions contained in this Restrictive Covenant shall run with the land with respect to the Property and shall be binding on all future owners, successors, lessees or assigns and their authorized agents, employees, or persons acting under their direction and control, and shall continue until U.S. EPA and MDEQ or their successors approve modifications to or rescission of this Restrictive Covenant. A copy of this Restrictive Covenant shall be provided to all future owners, heirs, successors, lessees, assigns and transferees by the Owner transferring the interest.

9. If any provision of this Restrictive Covenant is held to be invalid by any court of competent jurisdiction, the invalidity of such provision shall not affect the validity of any other provision of this Restrictive Covenant. All such other provisions shall continue unimpaired in full force and effect.

10. The undersigned person executing this Restrictive Covenant is the Owner, or has the express written permission of the Owner, and represents and certifies that he or she is duly authorized and has been empowered to execute and deliver this Restrictive Covenant.

11. All notices required under this Restrictive Covenant shall be sent to:

As to U.S. EPA:: Susan Prout, Esq.  
U.S. EPA – Region V  
77 West Jackson Blvd., C-14J  
Chicago, Illinois 60604

As to MDEQ: Remedial Project Manager – Forest Waste Site  
Michigan Department of Environmental Quality  
Environmental Response Division  
P.O. Box 30426  
Lansing, Michigan 48909-7926

As to the FWCC: Steven C. Nadeau, Esq.  
Honigman Miller Schwartz and Cohn  
2290 First National Building  
660 Woodward Avenue  
Detroit, Michigan 48226-3583  
(313) 465-7492 (phone)  
(313) 465-7493 (fax)  
snadeau@honigman.com (e-mail)

Any changes in the names or addresses of the contacts listed above shall be made in writing and shall be recorded in the same location where this Declaration is recorded.

IN WITNESS WHEREOF, the said Owner of the above described Property has caused this Restrictive Covenant to be executed on this \_\_\_\_ day of \_\_\_\_\_, 2002.

Instr: 200207170082220 07/17/2002  
P: 6 of 7 F: \$21.00 3:06PM  
Melvin Phillip McCree T20020024786  
Genesee County Register ML

Valerie Roberson  
Forest Township  
130 East Main  
Otisville, Michigan 48463

Signed in the presence of:

Louaine Bass  
Beverly Bloss

State of Michigan )  
                                  ) SS.  
County of Genesee )

The foregoing instrument was acknowledged before me this 12<sup>th</sup> day of July, 2002, by Valerie Roberson, Supervisor, Township of Forest, on behalf of the Township of Forest.

Phyllis Hilborn  
Notary Public Phyllis Hilborn  
Genesee County, Michigan  
My commission expires: 4-24-06

Prepared by:

Steven C. Nadeau, Esq.  
Honigman Miller Schartz and Cohn  
2290 First National Building  
660 Woodward Avenue  
Detroit, Michigan 48226



When recorded return to:

Sally Beebe  
MDEQ-ERD  
P.O. Box 30426  
Lansing, Michigan 48909-7926

Instr: 200207170082220 07/17/2002  
P: 6 of 7 F: \$21.00 3:06PM  
Melvin Phillip McCree T20020024796  
Genesee County Register HL

Send subsequent tax bills to:

Forest Township  
130 East Main Street  
Otisville, Michigan 48463-9455

DET\_B162841.2

Instr: 200207170082220 07/17/2002  
P: 7 of 7 F: \$21.00 3:06PM  
Melvin Phillip McCree T20020024786  
Genesee County Register ML

**EXHIBIT A**

**LEGAL DESCRIPTION**

**Parcel 09-08-400-012**

Township of Forest

Town 9 North, Range 8 East, Section 8

A parcel of land beginning 814.67 ft E of S  $\frac{1}{4}$  corner of Section thence E 527 ft thence N  $0^{\circ}43'47''$  E 1195 ft thence S  $80^{\circ}38'13''$  E 1265 ft thence N  $0^{\circ}43'47''$  E 404.58 ft thence N  $80^{\circ}38'13''$  W 1265 ft thence N  $0^{\circ}43'47''$  E 1055.92 ft thence N  $89^{\circ}43'34''$  W 676.96 ft thence S  $0^{\circ}43'47''$  W 2368.74 ft thence E 150 ft thence S  $0^{\circ}43'47''$  W 290 ft to POB  
W101

Township of Forest

Town 9 North, Range 8 East, Section 8

A parcel of land beginning 1341.67 ft E of S  $\frac{1}{4}$  corner of Section thence E 265.07 ft thence N  $0^{\circ}40'07''$  E 450 ft thence E 665.93 ft thence S  $0^{\circ}40'07''$  W 224.88 ft thence E 386 ft thence N  $0^{\circ}40'07''$  E 2424.07 ft thence N  $89^{\circ}43'34''$  W 1314.11 ft thence S  $0^{\circ}43'47''$  W 1055.92 ft thence S  $80^{\circ}38'13''$  E 1265 ft thence S  $0^{\circ}43'47''$  W 404.58 ft thence N  $80^{\circ}38'13''$  W 1265 ft thence S  $0^{\circ}43'47''$  W 1195 ft to POB  
W102

Township of Forest

Town 9 North, Range 8 East, Section 18

A parcel of land beginning at NE corner of Lot 5 Chandler Sub thence W 536 ft thence N 100 ft thence E 436 ft thence SELY to POB  
W233E

**Parcel ID #09-08-200-001**

Township of Forest

Town 9 North, Range 8 East, Section 8

The S  $\frac{1}{2}$  of the NE  $\frac{1}{4}$  Section 8, Town 9 North, Range 8 East, 80 acres of Forest Township, Genesee County, Michigan, less reservation to Richard L. Hughes and Suzanne H. Hughes, husband and wife, of all of the oil, gas, and mineral rights to the above-described property

# **Genesee County Environmental Health Regulations**

**Genesee County Health Department  
630 S. Saginaw Street  
Flint, MI 48502-1540**

**Phone: (810) 257-3603**

**October, 2002**

## **CHAPTER IV WATER WELL CONSTRUCTION, ABANDONMENT AND GROUNDWATER PROTECTION REGULATION**

**PREAMBLE** - It is hereby recognized that supply of safe potable water is fundamental to individual, public, and community health; that water supply facilities installed and operated in a proper manner are necessary for safeguarding public health; that water supplies furnishing water for human consumption need to be isolated and protected from sewage or other sources of pollution; that proper construction and abandonment of wells is an integral part of groundwater protection and that contamination of water resources and supplies, or the creation of conditions menacing the public health, should be prevented. This regulation governing water supplies is hereby adopted pursuant to Sections 2435 and 2441 of Michigan's Public Health Code, Act 368 of the Public Acts of 1978, as amended, being Sections 333.2435 and 333.2441 of the Michigan Compiled Laws.

### **SECTION 1.0 - SCOPE**

This regulation shall apply to all premises in Genesee County, Michigan. This regulation shall not apply to Type I public water supplies, as defined by Michigan's Safe Drinking Water Act, Act 399 of the Public Acts of 1976, as amended, being sections 325.1001 through 325.1023 of the Michigan Compiled Laws, and Administrative Rules promulgated pursuant to that Act.

### **SECTION 2.0 - DEFINITIONS**

#### **SECTION 2.1 - SAFE AND ADEQUATE WATER SUPPLY**

"Safe and adequate water supply" means a water supply which is constructed and located in such a manner as to provide water which will not endanger the health of the user and which provides sufficient water yield and pressure to operate all connected plumbing fixtures.

#### **SECTION 2.2 - WATER SUPPLY**

"Water supply" means a system of pipes and structures through which water is obtained, including but not limited to, the source of the water such as wells, surface water intakes, or hauled water storage tanks; and pumping and treatment equipment, storage tanks, pipes and appurtenances, or a combination thereof, used or intended to furnish water for domestic or commercial use.

#### **SECTION 2.3 - WELL**

"Well" means an opening in the surface of the earth for the purpose of obtaining ground water, monitoring the quality or quantity of ground water, obtaining geologic information on aquifers, recharging aquifers, purging aquifers, utilizing the geothermal properties of earth formations, or removing ground water for any purpose. Wells as defined in this section include, but are not limited to:

- a.) A water supply well used to obtain water for drinking or domestic purposes.
- b.) An irrigation well used to provide water for plants, livestock, or other agricultural processes.
- c.) A test well used to obtain information on ground water quantity, quality, or aquifer characteristics, for the purpose of designing or operating a water supply well.
- d.) A recharge well used to discharge water into an aquifer.
- e.) A dewatering well used to lower the ground water level temporarily at a construction site.
- f.) A heat exchange well used for the purpose of utilizing the geothermal properties of earth formations for heating or air conditioning.
- g.) An industrial well used to supply water for industrial processes, fire protection, or similar non-potable uses.
- h.) A fresh water well at an oil or gas well drilling site, when the fresh water well is to be retained after completion of the oil or gas drilling operation.

### **SECTION 3.0 - POWERS AND DUTIES OF THE HEALTH OFFICER**

**SECTION 3.1 – REGULATE** The Health Officer shall have the authority to regulate the design, installation, operation, maintenance, abandonment, and plugging of all water supplies under the jurisdiction of the Genesee County Health Department.

**SECTION 3.2 – ESTABLISH GUIDELINES** The Health Officer may establish procedures and guidelines concerning the interpretation of this regulation. Such procedures and guidelines may be subject to review and approval by the Board of Health.

### **SECTION 4.0 – APPLICATION OF OTHER LAWS**

The Genesee County Health Department incorporates by reference, and adopts as part of this regulation, the definitions and requirements with respect to water well construction, pump installation and well abandonment as set forth in:

- a.) The "Safe Drinking Water Act", Act No 399 of the Public Acts of 1976, as amended, being sections 325.1001 through 325.1023 of the Michigan Compiled Laws, and the following sections of Administrative Rules promulgated pursuant to that Act: Part 1, being R 325.10101 to R 325.10115; Part 4, being R 325.10401 to R 325.10409; Parts 7 and 8, being R 325.10701 to R 325.10833; and Parts 10 through 14, being R 325.11001 to R 325.11407 of the Michigan Administrative Code, and any subsequent revisions thereto, and
- b.) Part 127 of Michigan's Public Health Code, Act No. 368 of the Public Acts of 1978, as amended, being sections 333.12701 through 333.12715 of the Michigan Compiled Laws, and the administrative rules promulgated pursuant to that Act, being R 325.1601 through R 325.1676 of the Michigan Administrative Code, and any subsequent revisions thereto.

## **SECTION 5.0 - WATER SUPPLY CONSTRUCTION PERMIT REQUIRED**

No person shall begin construction of a new water supply, or make extensive changes to existing water supplies, without first obtaining a construction permit from the Genesee County Health Department. Permit application shall be made at least three (3) business days prior to construction. Extensive changes include replacing the well casing, removing a well casing from the ground, changing aquifers or sources of water, changing screen elevation, deepening or plugging back a bedrock well, changing the pump type, installing a liner pipe, and a significant increase in the capacity of the water supply.

## **SECTION 6.0 – PERMIT APPLICATION PROCEDURE**

**SECTION 6.1** - Application forms are available at the Department. The application forms and required fee must be received in person or by mail as noted in section 5.0. Application shall consist of:

- A. Name of well drilling contractor
- B. Property owner and mailing address
- C. Township and street address of well location
- D. Date of proposed construction
- E. Scaled site plan showing:
  - 1.) Scale used and North direction
  - 2.) Lot lines, easements, and deed restrictions
  - 3.) Surface water (lakes, ponds, rivers, ditches, etc.)
  - 4.) Location of house, outbuildings, driveway
  - 5.) Location of proposed well and any other wells within 50' of the property line
  - 6.) Location of all buried sewer lines, septic tanks, drain fields within 50' of the property line
  - 7.) Location of all other sources of contamination within 800' of the property line (such as: active area of landfill, land or subsurface application of septage or sludge waste, oil or gas wells, petroleum product processing or storage, fertilizer or agricultural chemical preparation/ storage, outhouses, animal or poultry yards)

**SECTION 6.2 – DENIAL OF PERMITS** The Health Officer may deny a permit or issue a restricted permit under one or more of the following conditions:

- A. When incomplete, inaccurate or false information is provided by the applicant:
- B. When the proposed water supply system or water supply well will not comply with Part 127 of Act 368, P.A. 1978, as amended or Act 399 of 1976 as amended:
- C. Where the proposed location of the proposed water supply system or water supply well is in an area where the Michigan Department of Environmental Quality has issued an advisory against the use of water supply wells in the area or if the location is within a service area defined by the Michigan Department of Environmental Quality pursuant to R299.5409 as amended unless special well construction techniques or screening of a well at a depth not affected by

contamination would allow the well to be isolated from the contamination which resulted in the issuance of an advisory or the establishment of a service area by the Michigan Department of Environmental Quality.

- D. Where a water supply system or water supply well is proposed to be served by groundwater which the Health Department has knowledge is contaminated or likely to be contaminated by a hazardous substance in excess of the residential drinking water criteria unless special well construction techniques or screening of a well at a depth not affected by contamination would allow the well to be isolated from the contamination. Hazardous substance and residential drinking water criteria have the same meaning as when those terms are used in Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. When the Health Department has made such a determination, the Health Department shall make available to the public, upon request, a map of the area affected by this determination.
- E. Other circumstances or conditions which the Health Officer believes may be detrimental to an individual or the public's health.

#### **SECTION 7.0 – LATE APPLICATION PENALTY**

If a person fails to make application for a well construction permit from the Genesee County Health Department at least three (3) business days prior to beginning construction of a water supply, a penalty fee equal to the regular application fee shall be assessed. Within five (5) business days of being notified of the violation, the person shall submit the regular application fee and the penalty fee to the Health Officer. Payment of the penalty fee shall not exempt said person from any further penalties prescribed for violation of this regulation. The Department shall not be liable for costs already incurred prior to permit issuance.

The Health Officer may waive the penalty fee when, upon consideration of relevant facts and circumstances, said penalty fee constitutes an undue hardship on the applicant.

#### **SECTION 8.0 - ABANDONMENT OF NEWLY CONSTRUCTED WELLS**

The Health Officer may require the abandonment and plugging of a well that is constructed without prior notification or is constructed in violation of this regulation.

#### **SECTION 9.0 - ABANDONMENT OF PREVIOUSLY CONSTRUCTED WELLS**

When a well becomes abandoned, it must be properly plugged. If the well is not properly plugged for justifiable reason (being used as a secondary water source, temporarily inaccessible, etc.) the Health Officer may file an affidavit with the Genesee County Register of Deeds so a permanent record is created which states an unplugged well exists on that parcel of land.

## **SECTION 10.0-WATER SUPPLY AND GROUNDWATER CONTAMINATION**

The Health Officer may take any legal means necessary to prevent or eliminate water supply and groundwater contamination caused by, but not limited to, wells, abandoned wells, and water supplies.

## **SECTION 11.0 – WATER SAMPLING**

In accordance with R 325.1661 of the Michigan Administrative Code, the well drilling contractor shall notify the water supply owner of the owner's responsibility to collect one or more water samples from the sampling faucet prior to placing the water system into service. Organisms of the coliform group shall not be present in the sample(s).

## **SECTION 12.0 - INSPECTION**

The Health Officer may make inspections of water supplies during and/or after completion of construction as deemed necessary. A new water supply shall not be put into service until:

- a) A completed "Water Well and Pump Record", prepared by the well driller and/or pump installer, as applicable, has been submitted to the Health Officer.
- b) The Health Officer has received copies of the results of water samples indicating the raw water quality meets minimum public health standards. Water sample analyses shall include coliform bacteria and any other parameter deemed necessary by the Health Officer.
- c) The water supply system is found to be in compliance with applicable code and permit requirements.

## **SECTION 13.0 - STOP WORK ORDER**

If the Health Officer determines that a water supply under construction does not comply with the requirements of this regulation, the Health Officer may issue a written stop work order. Work shall not resume until the owner and/or contractor have agreed to make corrections to comply with this regulation, and the Health Officer rescinds the stop work order.

## **SECTION 14.0 - EMERGENCY CONDITIONS**

In the event an emergency arises where the lack of water will result in undue hardship and the office of the Genesee County Health Department is closed, or when the well driller is involved with repair work and it is deemed necessary to begin construction immediately on a new well, a registered well driller may begin extensive changes to or construction of a new water supply without notification or permit. The well driller shall contact the Health Officer on the next regularly scheduled business day to notify of such installation. The late penalty specified in SECTION 7.0 of this regulation may be waived in these cases.

## **SECTION 15.0 –VIOLATION OF THE REGULATION**

A person who violates a regulation is guilty of a misdemeanor, punishable by imprisonment for not more than 90 days, or a fine of not more than \$200.00, or both.



## **SECTION 16.0 - EFFECTIVE DATE**

This regulation shall become effective on May 1, 1999.

## **SECTION 17.0 - RIGHT OF ENTRY AND INSPECTION**

No person shall refuse to permit the Health Officer, after proper identification, to inspect any premises in accordance with Section 2446 of Michigan's Public Health Code, Act 368 of the Public Acts of 1978, as amended, nor shall any person molest or resist the Health Officer in the discharge of those duties and the protection of the public health.

## **SECTION 18.0 - VALIDITY**

In the event any section, paragraph, sentence, clause, or phrase of these rules and regulations may be declared unconstitutional or invalid for any reason, the remainder of said rules and regulations shall not be affected thereby.

## **SECTION 19.0 - INJUNCTION OR OTHER PROCESS**

Notwithstanding the existence and pursuit of any other remedy, the Health Officer may maintain an action in the Name of Genesee County in a court of competent jurisdiction for injunction or other appropriate process against any person to restrain or prevent a violation of these regulations.

## **SECTION 20.0 - FEES**

The schedule of fees authorized by these regulations is established by the Board of Health, in accordance with Section 2444 (1) of Michigan's Public Health Code, Act 368 of the Public Acts of 1978, as amended. Fees paid to the Genesee County Health Department shall be credited to the Genesee County Health Department account with the County Treasurer. The fees charged shall not be more than the reasonable cost of performing the service.

## **SECTION 21.0 - APPEALS**

Matters related to interpretation of the State of Michigan's well construction and pump installation statute and administrative rules are not within the jurisdiction of the Genesee County Environmental Health Board of Review.

TABLE 4.1

**INSTITUTIONAL CONTROLS COMMUNICATION PLAN  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN**

INITIATOR	CONCERN	FORM	RECIPIENT
FWCC	Conditions of, routine damage to, and routine repairs to fence and warning signs based on field observations	Corresponding monthly progress reports	EPA MDEQ FT
FWCC	Major damage to fence and repair work based on field observations	Immediate report	FT EPA MDEQ
		Corresponding monthly progress reports	EPA MDEQ FT
FWCC	Evidence of improper site usage based on field observations	Immediate report	FT EPA MDEQ
		Corresponding monthly progress reports	EPA MDEQ FT
FWCC	Unexpected new construction or development in the CAA or PPR based on informal drive by field observations	Annual report	EPA MDEQ FT GCHD
FWCC	Annual evaluation of institutional controls, including summary of field observations, inspection of deed, interviews with Township and County, annual checklist to well owners	Annual report	EPA MDEQ FT GCHD
FT	Annual routine updates on usage of the site, plans for development within the CCA or PRA, and zoning	Interview	FWCC
FT	Plans for major changes in site usage or development, changes in site ownership, and major construction or developments within the CCA or PRA	Verbal with follow up letter, if needed	EPA FWCC MDEQ GCHD
FT	Routine damage to fences or warning signs based on field observations	Verbal	FWCC
FT	Major damage to fences based on field observations, or if repairs are not made in response to reports of routine damage	Verbal with follow up letter, if needed	EPA MDEQ FWCC
FT	Evidence of improper site usage based on field observations	Verbal with follow up letter, if needed	EPA MDEQ FWCC
GCHD	Annual routine updates on restriction of well installations in the CCA and PRA	Interview	FWCC
GCHD	Plans for major construction or development in the CCA or PRA, or major changes in regulations or programs that affect the restriction of well drilling in the CCA or PRA	Verbal with follow up letter, if needed	EPA FWCC MDEQ FT
GCHD	Technical support needed for oversight of well drilling in the CCA or PRA	Verbal with follow up letter, if needed	EPA
GCHD	Technical support needed for evaluation of proposed major additional pumping in the PRA, including in the bedrock aquifers	Verbal with follow up letter, if needed	EPA

**INSTITUTIONAL CONTROLS COMMUNICATION PLAN  
FOREST WASTE SITE  
OTISVILLE, MICHIGAN**

<b>INITIATOR</b>	<b>CONCERN</b>	<b>FORM</b>	<b>RECIPIENT</b>
MDEQ	Changes needed to GCHD regulations	Letter	EPA GCHD
EPA	Changes needed to restrictive covenant	Letter	FT FWCC
EPA	Changes needed to site usage	Letter	FT FWCC
EPA	Improvements needed to fences/signs	Letter	FWCC FT
EPA	Requests for technical support	Verbal with follow up letter, if needed	FWCC MDEQ

**Notes:**

FWCC: Forest Waste Coordinating Committee

MDEQ: Michigan Department of Environmental Quality

EPA: United States Environmental Protection Agency

FT: Forest Township

GCHD: Genesee County Health Department

**List of Contacts:****For EPA:**

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**For MDEQ:**

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**For FT:**

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Monday, March 19, 2007 A11

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### EPA Begins Review of the Forest Waste Disposal Superfund Site Otisville, Michigan

U.S. Environmental Protection Agency is beginning a third five-year review of the Forest Waste Superfund site in Otisville, Mich. Superfund law requires reviews of sites where the cleanup is either in progress or completed but hazardous waste remains managed on-site. These five-year reviews ensure the cleanup continues to protect human health and the environment.

The Forest Waste Disposal site included nine lagoons and a landfill, both used for disposal of hazardous wastes, and ground water contamination from those areas. EPA's cleanup plan for this site includes the following: digging up and off-site disposal of contaminated lagoons (completed by 1989); removal of numerous barrels containing waste from the landfill (completed by 1993); capping the landfill (completed by 1997); restrictions on usage of the site and ground water near the site (in place by 2005); treatment of ground water north of the landfill (still under investigation); maintenance of the landfill cap (ongoing); and long-term monitoring (ongoing).

In the second five-year review completed in 2002, EPA found the cleanup actions were working in the short-term because there was no evidence of any human exposure to contaminants. EPA stated the following work was needed in addition to the ongoing maintenance and monitoring for the cleanup to continue protecting human health and the environment:

- Completion of investigation of the ground water contamination north of the landfill;
- Treatment or control of the ground water contamination north of the landfill;
- Continued monitoring of a nearby residential well;
- Updating the ground water monitoring plan;
- Restricting usage of ground water in the vicinity of the site;
- Conducting air sampling; and
- Conducting gas monitoring.

This five-year review will include an evaluation of background information, cleanup requirements, cleanup effectiveness, the plans for the ground water treatment, and restrictions on usage of the site and nearby ground water. The review may also identify actions to improve the cleanup or to reduce costs. Within a few months, following completion of plans for the ground-water treatment system, EPA will prepare a fact sheet and meet with the public in Otisville to update interested parties on work at the site.

Site information is at: Forest Township Library  
130 E Main Street  
Otisville, Mich

For further information contact: Richard Boice, Project Manager  
U.S. EPA Region 5, (SR 6J)  
77 W. Jackson Blvd.  
Chicago, IL 60604  
(800) 621-8431 Ext. 64740, weekdays 10:30 a.m. to 5:30 p.m.  
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